

The determination of selection criteria for the horticultural use of indigenous plants in South Africa

by

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Preface

In order to achieve the goals implied in the title of this study “The determination of selection criteria for the horticultural use of indigenous plants in South Africa”, the author’s research by necessity first had to identify and examine a range of matters that are unique to the industry in order to compile the said criteria.

The very rich diversity of indigenous South African flora ought to have ensured that such plants found abundant horticultural applications in our country. In reality, though, these plants seem to be underutilised in the horticulture industry. This state of affairs suggests that there might be several restraining factors inhibiting their more widespread horticultural use.

This study has uncovered a number of such factors, among which count important unmet needs among consumers and growers related to their selecting new ornamental plants for decorative and commercial production purposes, respectively. Other restricting factors include competition from exotic plants.

A particular focus of this study has been the criteria which consumers and growers apply when selecting plants for various applications, along with other considerations that make up the dynamics of the respective selection processes.

It is hoped that the results of this study will enable industry role-players to better understand and meet the needs of consumers and growers, especially in respect of indigenous plants for ornamental and horticultural use. By improving the industry’s response to market needs and opportunities in this particular instance, one should also be able to increase the use of indigenous plants.

While the outcomes of this study may not always have been cast in the specialised terminology commonly used in horticultural and commercial circles, the author has endeavoured to convey to the reader the essence of the results produced by her research.

The author furthermore does not claim to have developed comprehensive solutions to all the problems identified in the course of her research. Instead, the recommendations regarding plant selection criteria contained in this paper should be viewed as only a first attempt to create a set of practical guidelines for this purpose. The author therefore invites interested parties to comment on her work.

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Curriculum Vitae

Lorraine Middleton holds a B.Sc. degree in Natural Science, two B.Sc. honours degrees in Botany and Zoology, respectively, and a masters degree in Botany which was awarded to her *cum laude* by the University of Pretoria. She has been engaged in natural sciences research throughout her academic career which started in 1978.

From 1983 to 1989 she worked in the horticulture industry in a sales and marketing capacity. Her practical experiences in later running her own horticultural businesses between 1989 and 2002 served to ground her in the commercial aspects of plant selection for horticultural use.

From 1998 until 2009 she was the curator of the Manie van der Schijff Botanical Garden at the University of Pretoria and chairperson of the Garden Committee.

From 2004 to 2009 she presented lectures in Plant Sciences to undergraduate Landscape Architecture students, and was responsible for preparing and supplying plant materials for Botany students at the University of Pretoria.

At present she is a lecturer in Botany, teaching undergraduate and post-graduate students at the Medunsa Campus of the University of Limpopo. She has authored and co-authored a number of articles on utilising botanical gardens as academic training facilities, and on the horticultural use of indigenous plants in South Africa, which have appeared in specialised publications in this country and abroad.

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- The Department of Statistics at the University of Pretoria for their assistance in drafting the questionnaires in the proper format and for conducting the statistical analysis of the survey data.
- My promoter Prof. PT Vosloo (Department of Architecture, University of Pretoria).

All opinions expressed in this study are my own, unless stated otherwise. This treatise is the result of my work as an academic and botanist.

Not unto us, O LORD, not unto us,

But to Your name give glory ...

Psalm 115: 1, *New King James Version, 1983*

Abstract

The determination of selection criteria for the horticultural use of indigenous plants in South Africa

The brief discussion of the history of ornamental plants at the start of the thesis is intended to provide the background to this study. It is followed by an exposition of the values that ornamental plants bring to our world in terms of their physical, psychological and economic benefits. To a great many people increasing urbanisation all over the globe means that ornamental plants often provide their only link to the natural world.

Using plants in gardens and landscaped environments for the benefit and enjoyment of humankind comes at a price. As more landscape projects are being undertaken by public and corporate bodies and also private individuals, and as the costs of their creation and maintenance keep on rising, those responsible are becoming keenly interested in selecting the most suitable plants to match their needs from the outset, as well as in containing the cost of their subsequent upkeep.

The ornamental plant industry today is characterised by its great diversity, as are the indigenous flora of South Africa. The aim of this study is to investigate current patterns of ornamental plant usage in South Africa, and to determine the most appropriate selection criteria for the horticultural use of indigenous plants in South Africa.

Using only the physical characteristics of plants as a selection criterion for sourcing new ornamental plants from indigenous South African flora, ignores other important considerations that should form part of the process of making informed selection

choices on the part of the growers, suppliers and consumers. These considerations in fact constitute significant needs among especially consumers and growers that should be investigated, first, in order to understand them and then to craft practical solutions. In exploring these considerations, one should bear in mind that there are a number of factors inhibiting the horticultural use of indigenous plants in South Africa, including serious competition from exotic plants.

This study has three specific focus areas, namely: (1) identifying those considerations that have a bearing on the formulation of selection criteria of indigenous South African flora as new ornamental plants; (2) establishing whether growers and cultivators of indigenous plants are responding adequately to market possibilities and industry trends; and (3) determining what other factors may inhibit the horticultural use of such plants.

The study shows that there is indeed a range of selection criteria that consumers and growers apply when selecting indigenous plants for horticultural uses. The formalisation and practical application of such selection criteria could also help industry role-players to take better advantage of the market opportunities for indigenous plants. An ongoing interaction and exchange of ideas between growers of ornamental plants and their customers would be a precondition for the success of such a process. While the needs of these two groups differ in some respects, they converge in others. Finding the greatest measure of compatibility between the two sets of needs requires a closer examination of the selection criteria for the horticultural use of indigenous plants in South Africa.

A review of the literature produced a collection of the most common factors pertaining to ornamental plant selection. A formal survey was compiled, based on these considerations, which was used to test their validity and relative importance among retailers, landscapers and ornamental plant growers in South Africa.

The final chapter contains the findings, conclusions and recommendations produced by this study. The recommendations include, among others, suggestions for the use of additional selection criteria.

The survey also revealed some questions that could be the subject of future research, but which fell outside the ambit of this study. Recommendations in this regard have been made accordingly.

Keywords

selection criteria, horticulture, indigenous flora, South Africa, ornamental plant, landscape plant, garden plant, plant grower, nursery, market possibilities, consumer

Ekserp

Die bepaling van seleksiekriteria vir die tuinboukundige gebruik van inheemse plante in Suid Afrika

Aan die begin van die verhandeling verskyn 'n kort oorsig van die geskiedenis van sierplante ter agtergrond. Dit word gevolg deur 'n uiteensetting van die fisiese, sielsversorgende en ekonomiese waardetoevoegings wat sierplante tot ons leefwêreld maak. Versnellende verstedeliking dwarsoor die aardbol beteken dat sierplante vir baie mense dikwels hul enigste kontak met die natuur uitmaak.

Die gebruik van plante in tuine en parkaanlegte ons ten voordeel en plesier kos natuurlik geld. Namate openbare en korporatiewe instansies en private individue al hoe meer tuinaanlegte skep, en na mate dit al hoe duurder word om hierdie projekte aan te lê en in stand te hou, neem die belangrikheid daarvan toe dat die mees geskikte plante vanuit die staanspoor geselekteer word, asmede die beteueling van die onderhoudskoste daarna.

Die sierplantbedryf word vandag gekenmerk deur 'n ryke verskeidenheid, soos ook die inheemse flora van Suid Afrika. Die doel van hierdie studie is om die huidige gebruikspatrone van sierplante en die seleksiekriteria vir die tuinboukundige gebruik van inheemse plante in Suid Afrika te bepaal.

Deur slegs die fisiese eienskappe van plante as maatstaf te gebruik vir die seleksie van nuwe sierplante vanuit inheemse Suid-Afrikaanse flora, negeer ander belangrike oorwegings in hierdie verband wat deel behoort uit te maak van ingeligte besluitneming deur plantkwekers, verskaffers en verbruikers. Sodanige oorwegings verteenwoordig in der waarheid beduidende behoeftes onder veral verbruikers en plantkwekers wat ondersoek moet word, ten einde, eerstens, 'n beter begrip daarvan te ontwikkel, gevolg deur die ontwerp van praktiese oplossings. In die ondersoek na

hierdie behoefte-oorwegings moet rekening gehou word met daardie faktore wat die tuinboukundige gebruik van inheemse plante in Suid-Afrika beperk, insluitende sterk mededinging deur eksotiese plante.

Hierdie studie beslaan drie spesifieke fokusareas, te wete: (1) die identifisering van daardie oorwegings wat verband hou met die ontwerp van maatstawwe vir die seleksie van inheemse Suid-Afrikaanse flora vir gebruik as sierplante; (2) 'n peiling of kwekers van inheemse plante markgeleenthede en bedryfstendense behoorlik benut; en (3) 'n bepaling van welke ander faktore die tuinboukundige gebruik van sodanige plante mag beperk.

Die studie toon dat verbruikers en plantkwekers inderdaad 'n reeks keuringsmaatstawwe gebruik vir die seleksie van inheemse plante vir tuinboukundige gebruike. Die formalisering van sodanige keuringsmaatstawwe en hul aanwending in die praktyk behoort rolspelers in die tuinboubedryf in staat te stel om markgeleenthede vir inheemse plant beter te benut. Dit sal 'n deurlopende interaksie en wisselwerking van idees tussen sierplantkwekers en hul klante verg ten einde die sukses van so 'n proses te verseker. Terwyl die behoeftes van hierdie twee groepe in sommige opsigte verskil, is daar ook 'n mate van ooreenstemming in ander. 'n Nadere ondersoek van seleksiekriteria vir die tuinboukundige gebruik van inheemse plante in Suid-Afrika is nodig ten einde te bepaal waar lê die grootste mate van ooreenstemming tussen hierdie twee onderskeidelike stelle behoeftes.

'n Oorsig van publikasies was die bron vir die samestelling van 'n lys van die mees algemene faktore wat sierplantseleksie beïnvloed. 'n Meningspeiling is dienoooreenkomstig ontwerp ten einde die geldigheid en relatiewe belangrikheid van elk van hierdie faktore te toets. Die opname is gedoen onder groothandelaars, landskapsdeskundiges en sierplantkwekers hier te lande.

Die bevindinge, gevolgtrekkings en aanbevelings wat hierdie studie opgelewer het, is vervat in die slothoofstuk. Die aanbevelings sluit onder meer in voorstelle vir die gebruik van bykomstige seleksiekriteria.

Deur die meningspeiling het daar bepaalde vraagstukke na vore getree wat moontlik in die toekoms nagevors behoort te word, maar wat buite strekking van die onderhawige studie lê. Paslike aanbevelings is in hierdie verband gemaak.

Sleutelwoorde

sierplant, seleksiekriteria, tuinboukunde, inheemse flora, Suid-Afrika, landskap, tuin, plantkweker, kwekery, markgeleenthede, verbruiker.

Table of Contents

CHAPTER 1 - INTRODUCTION

1.1	Rationale of the study.....	1
1.2	Statement of the main problem.....	4
1.3	Statement of the sub-problems.....	4
1.3.1	Sub-problem 1.....	4
1.3.2	Sub-problem 2.....	4
1.3.3	Sub-problem 3.....	5
1.4	Hypothesis.....	5
1.4.1	Hypothesis 1.....	5
1.4.2	Hypothesis 2.....	5
1.4.3	Hypothesis 3.....	5
1.5	Research scope delimitations.....	6
1.6	Assumptions.....	6
1.7	Objectives.....	7
1.8	Research methodology.....	7
1.8.1	Introduction.....	7
1.8.2	Research Methodologies.....	11
1.8.3	Qualitative research methods used for this study.....	17
1.8.3.1	A review of the literature.....	17
1.8.3.2	Field research.....	17
1.8.4	Quantitative research methods used for this study.....	19
1.8.5	Summary of the research design.....	22
1.9	Importance of the study.....	22
1.10	Layout of the thesis.....	23

CHAPTER 2 - BACKGROUND TO THE STUDY

2.1	Introduction.....	26
2.2	A brief historical overview of ornamental plant use.....	26
2.2.1	Introduction.....	26

2.2.2	The beginnings of plant utilisation as ornamentals.....	28
2.3	A brief history of gardening in South Africa.....	34
2.3.1	Introduction.....	34
2.3.2	The use of exotic and indigenous plants in South African gardens.....	38
2.3.3	Introduced cultivated plants.....	40
2.4	The value of ornamental plants.....	41
2.4.1	Introduction.....	41
2.4.2	Functional value.....	43
2.4.2.1	Microclimate enhancement.....	43
2.4.2.2	Airflow control and windbreaks.....	44
2.4.2.3	Air Purification.....	44
2.4.2.4	Erosion control.....	45
2.4.2.5	Screening.....	45
2.4.3	Psychological value.....	46
2.4.3.1	Healing, stimulation and inspirational value.....	46
2.4.3.2	Morals and ethics.....	47
2.4.3.3	Symbolic value.....	48
2.4.3.4	Intellectual needs.....	49
2.4.4	Aesthetic value.....	50
2.4.5	Economic value.....	53
2.5	Conclusions.....	54
2.5.1	Historical background.....	54
2.5.2	The value of ornamental plants.....	55

CHAPTER 3 - FACTORS INFLUENCING THE SELECTION OF NEW ORNAMENTAL PLANTS

3.1	Introduction.....	57
3.2	Environmental issues.....	57
3.2.1	Introduction.....	57
3.2.2	Urban greening and environmental horticulture.....	58
3.2.3	New plants from the wild.....	62

3.2.4	Invasive plants.....	63
3.3	Commercial competition for the horticultural use of South African indigenous plants.....	65
3.3.1	Exotic plants.....	65
3.3.2	Popular horticultural plants poorly represented in the South African flora.....	67
3.4	The domestication of wild plants.....	68
3.5	Sources of new ornamental plants.....	70
3.5.1	Introduction.....	70
3.5.2	Botanical gardens, collectors and specialist nurseries.....	71
3.5.3	Fashion revivals and re-introductions.....	73
3.5.4	Heritage plants and ancient cultivars.....	75
3.5.5	New applications for known plants.....	78
3.5.6	Horticultural neglected species.....	78
3.5.7	New cultivars.....	79
3.6	Natural attributes of plants.....	82
3.6.1	Undesirable natural characteristics.....	82
3.6.1.1	Specialised survival and reproduction strategies in nature that are harmful to human health.....	82
3.6.1.2	Adaptations and characteristics that appear strange to the consumer.....	83
3.6.1.3	The need for veld fires and burning to stimulate plant growth.....	83
3.6.1.4	Exceptionally large underground structures.....	84
3.6.1.5	The whole plant is unattractive or untidy.....	84
3.6.1.6	The plant needs a specialised habitat and will not grow elsewhere.....	84
3.6.1.7	Monocarpic plants	84
3.6.1.8	An unpleasant or foetid smell.....	85
3.6.1.9	Specialised symbiotic associations.....	85
3.6.1.10	Specialised reproductive strategies.....	85
3.6.2	Plant morphology.....	86
3.6.3	Plant physiology.....	88

3.7	Ornamental plants in the commercial environment.....	90
3.7.1	General trends in consumer markets.....	90
3.7.2	Consumer demands for outdoor plants.....	91
3.7.3	Consumer lifestyle and behaviour influencing plant choice.....	95
3.7.4	Grower's and plant breeder's issues.....	97
3.8	Horticultural criteria for ornamental plants.....	100
3.9	Conclusion.....	104

CHAPTER 4 - THE SURVEY AND RESULTS OF THE SURVEY

4.1	Introduction.....	108
4.1.1	Issues concerning the growers of ornamental plants in South Africa addressed in the survey questionnaire.....	110
4.1.1.1	Institutions, botanical gardens and distinctive gardens – South Africa.....	110
4.1.1.2	Institutions, botanical gardens and distinctive gardens – abroad.....	111
4.1.1.3	Ornamental plant growers – South Africa.....	111
4.1.1.4	Ornamental plant growers – abroad.....	112
4.1.1.5	Symposia, seminars and conferences.....	112
4.1.2	Issues concerning the consumers of ornamental plants in South Africa addressed in the survey questionnaire.....	113
4.1.2.1	Trade shows – South Africa.....	113
4.1.2.2	Trade shows – abroad.....	114
4.2	The Survey.....	114
4.2.1	The survey questionnaire.....	114
4.2.2	Design of the survey questionnaire.....	115
4.2.3	Issues addressed in the survey questionnaires of this study.....	116
4.2.4	Pre-testing the questionnaire and ethical considerations	117
4.2.5	Selecting a target population.....	118
4.2.6	The categories of questionnaires of this study.....	118
4.2.7	The survey target populations of this study.....	119
4.2.8	Questionnaires sent out and responses received.....	120

4.3	Specific treatment of the main problem and sub-problems.....	123
4.3.1	Main problem.....	123
4.3.2	Sub-problem 1.....	124
4.3.3	Sub-problem 2.....	125
4.3.4	Sub-problem 3.....	125
4.4	The data and its interpretation.....	126
4.4.1	Question 2 Section A Demographics (put to both categories).....	130
4.4.2	Question 3 Section A Demographics (put to both categories).....	131
4.4.3	Question 4 Section B Consumer knowledge and attitude towards indigenous plants (put to both categories).....	133
4.4.4	Question 5 Section B Consumer knowledge and attitude towards indigenous plants (put to both categories).....	134
4.4.5	Reliability of the statistics contained in Section B Consumer knowledge about and attitudes towards indigenous plants.....	145
4.4.6	Question 6 Section C Market demand and consumer selection criteria (put to both categories).....	147
4.4.7	Summary of the survey results on market demand and consumers' selection criteria.....	163
4.4.7.1	The most important set of consumer needs in respect of ornamental plants.....	163
4.4.7.2	The second most important set of consumer needs in respect of ornamental plants.....	164
4.4.7.3	The third most important set of consumer needs in respect of ornamental plants.....	165
4.4.7.4	The least important set of consumer needs in respect of ornamental plants.....	165
4.4.8	Question 7 Section D Industry trends and market possibilities (put to both categories).....	166
4.4.9	Summary of the survey results on industry trends and market possibilities for indigenous plants.....	193
4.4.9.1	The most important set of horticultural groups for the introduction of new indigenous plants to the market...	194
4.4.9.2	The second most important set of horticultural	

	groups for the introduction of new indigenous plants to the market.....	194
4.4.9.3	The third most important set of horticultural groups for the introduction of new indigenous plants to the market.....	195
4.4.10	Question 8 Section E Growers selection criteria (put to growers)	196
4.4.11	Summary of the survey results on growers' selection criteria.....	208
4.4.11.1	The most important set of growers' needs in respect of ornamental plants.....	208
4.4.11.2	The second most important set of growers' needs in respect of ornamental plants.....	209
4.4.11.3	The third most important set of growers' needs in respect of ornamental plants.....	210
4.4.11.4	Growers' needs in respect of ornamental plants that are of lesser importance.....	210
4.4.11.5	The least important growers' need of ornamental plants.....	211
4.4.12	Question 9 Section E Domestication of wild plants (put to growers).....	211
4.4.13	Question 10 Section F Competition and limitations to the utilization of indigenous plants for horticultural purposes (put to growers).....	214
4.4.14	Question 11 Section F Competition and limitations to the utilization of indigenous plants for horticultural purposes (put to growers).....	217
4.5	Conclusions.....	220

CHAPTER 5 - DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1	Introduction.....	221
5.2	Selection criteria for the horticultural use of indigenous plants in South Africa.....	223
5.3	Consumer knowledge and attitude towards indigenous plants.....	224
5.3.1	Discussion of the findings about consumers' knowledge and attitudes towards indigenous plants.....	225
5.3.1.1	Consumers' positive attitudes towards indigenous plants.....	225
5.3.1.2	Fundamental ornamental plant attributes.....	227
5.3.1.3	Factors that have a negative impact on indigenous plant sales and usage.....	227
5.3.2	Conclusions in respect of consumers' knowledge about and attitude towards indigenous plants.....	228
5.3.2.1	Consumers' knowledge and attitudes.....	228
5.3.2.2	Dissemination of information within the industry.....	229
5.3.2.3	Fundamental ornamental plant attributes.....	230
5.3.2.4	Factors inhibiting the use of indigenous plants.....	230
5.3.3	Recommendations about consumers' knowledge of and attitude towards indigenous plants.....	232
5.4	Consumers' selection criteria for ornamental plants.....	232
5.4.1	Discussion of the findings about consumers' needs in respect of ornamental plants.....	233
5.4.2	Discussion of the findings regarding ornamental plant attributes important to consumers.....	237
5.4.3	Discussion of the findings on the horticulture performance of ornamental plants important to consumers'.....	238
5.4.4	Conclusions and recommendations regarding consumers' criteria for selecting ornamental plants.....	238

5.4.4.1	Conclusions and recommendations regarding consumer needs in respect of ornamental plants.....	238
5.4.4.2	Conclusions and recommendations about ornamental plant attributes important to the consumer.....	239
5.4.4.3	Conclusions and recommendations about aspects of the horticultural performance of plants important to consumers.....	240
5.5	Growers' criteria for selecting ornamental plants.....	241
5.5.1	Discussion of the findings regarding growers' needs in respect of the quality aspects of ornamental plants.....	241
5.5.2	Discussion of the findings regarding growers' needs in respect of the production and handling aspects of ornamental plants.....	243
5.5.3	Discussion of the findings regarding growers' needs in respect of the marketing and other economic aspects of ornamental plants.....	244
5.5.4	Discussions of the findings regarding growers' expectations in respect of the propagation aspects of ornamental plants.....	247
5.5.5	Discussion of the findings regarding the minimum period of good garden performance growers expect from horticultural crops.....	248
5.5.6	Discussion of the findings regarding the maximum production time and crop turnover growers expect from horticultural crops.....	248
5.5.7	Discussion of the findings regarding the ease or difficulty of domesticating wild plants.....	249
5.5.8	Conclusions regarding growers' needs in respect of ornamental plants.....	251
5.5.8.1	Conclusions regarding grower's needs in respect of the quality aspects of ornamental plants.....	251

5.5.8.2	Conclusions regarding growers' needs in respect of the production and handling aspects of ornamental plants.....	251
5.5.8.3	Conclusions about growers' needs in respect of market and economic aspects of ornamental plants.....	251
5.5.8.4	Conclusions about growers' expectations in respect of the propagation aspects of ornamental plants.....	252
5.5.8.5	Conclusions about grower's expectations in respect of the minimum period of good garden performance of horticultural crops.....	252
5.5.5.6	Conclusions about grower's expectations in respect of the maximum production time and crop turnover of horticultural crops.....	252
5.5.5.7	Conclusions about grower's experience of the ease or difficulty of the domesticating of wild plants.....	253
5.5.9	<i>Caveat</i> concerning recommendations and expert input regarding selection criteria to address growers' needs.....	253
5.5.10	Conclusion regarding Hypothesis 1.....	254
5.6	Industry trends and market possibilities.....	254
5.6.1	Discussion of the findings regarding the industry trends and market possibilities for indigenous plants.....	256
5.6.1.1	Edible indigenous plants.....	264
5.6.2	Conclusions and recommendations related to the market possibilities for indigenous plants.....	265
5.6.2.1	Cold-hardy plants.....	265
5.6.2.2	New species and cultivars are needed across the whole spectrum of indigenous growth forms.....	266
5.6.2.3	Succulents and curiosity plants.....	266
5.6.2.4	Indoor plants.....	266
5.6.2.5	Plant specifications and information.....	266
5.6.2.6	Edible indigenous plants.....	267

5.6.3	Conclusions regarding Hypothesis 2.....	267
5.7	Competition and limitations to the utilisation of indigenous plants for horticultural purposes in South Africa.....	267
5.7.1	Discussion of the findings related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa.....	268
5.7.2	Conclusions related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa.....	271
5.7.3	Recommendations related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa.....	272
5.7.3.1	Student training.....	272
5.7.3.2	Promotion of Indigenous plants amongst all population groups in South Africa.....	272
5.7.3.3	Greater exploration of overseas markets.....	272
5.8	The sources for new ornamental plants in South Africa.....	272
5.8.1	Discussion of the findings related to the sources for new ornamental plants in South Africa.....	273
5.8.2	<i>Caveat</i> concerning the collection of wild plants in South Africa...	277
5.8.3	Conclusions related to the sources for new ornamental plants in South Africa.....	278
5.8.4	Recommendations related to the sources for new ornamental plants in South Africa.....	278
5.8.5	Conclusion regarding Hypothesis 3.....	278
5.9	Recommendations for further research.....	279
5.9.1	Market research.....	279
5.9.2	Comprehensive database.....	280

Addenda

<u>Addendum A</u>	Questionnaire sent to growers of ornamental plants and scientists in the field of horticulture.....	293
<u>Addendum B</u>	Questionnaire sent to retailers in ornamental plants and professionals and knowledgeable parties in the field of landscaping.....	299
<u>Addendum C</u>	Covering letter accompanying the questionnaires.....	303
<u>Addendum D</u>	Responses to Section A of the questionnaires: Demographics....	304
<u>Addendum E</u>	Responses to Section B of the questionnaires: Consumer knowledge and attitude towards indigenous plants.....	306
<u>Addendum F</u>	Responses to Section C of the questionnaires: Market demand and consumer selection criteria.....	327
<u>Addendum G</u>	Responses to Section D of the questionnaires: Industry trends and market possibilities.....	349
<u>Addendum H</u>	Responses to Section E of the questionnaires: Growers selection criteria.....	380
<u>Addendum I</u>	Responses to Section F of the questionnaires: Competition and limitations to the utilisation of indigenous plants for horticultural purposes.....	403

List of Tables

<u>Table 1.1</u>	A comparison of the quantitative and qualitative styles in research (Neuman 1997:14).....	14
<u>Table 4.2.8.1</u>	Number of questionnaires sent out and the number of responses received from Category 1, ornamental plant growers.....	121
<u>Table 4.2.8.2</u>	Number of questionnaires sent out and the number of responses received from Category 2, garden centres, retail nurseries, landscape architects and landscape contractors.....	121
<u>Table 4.2.8.3</u>	Total number of questionnaires sent out in the survey and the number of responses received.....	124
<u>Table 4.4.2.1</u>	Demographics of the survey: The Region of business and kind of operation respondents were involved in.....	132

List of Figures

<u>Figure 3.9.1</u>	The route of an ornamental plant from nature to the consumer	106
---------------------	--	-----

References	281
-------------------	-------	-----

ABBREVIATIONS

ARC:	Agricultural Research Council of South Africa (the Fynbos Unit at Elsenburg Farm and the Roodeplaat Vegetable and Ornamental Plant Institute)
CBD:	Convention on Biological Diversity
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DvP-CLO:	Department of Plant Genetics and Breeding, Ministry of Small Enterprises, Traders and Agriculture, Belgium
EC:	European Commission
EU:	European Union
EUCARPIA:	European Association for Research on Plant Breeding
IPPS:	International Plant Propagator's Society
ISE:	International Society for Ethnopharmacology
ISHS:	International Society for Horticultural Sciences
NBG(s):	South African National Botanic Garden(s)
OECD:	Organisation of Economic Co-operation and Development (EU)
PBR:	Plant Breeder's Rights
PCS:	Proefcentrum voor Sierteelt, Research Centre for Ornamental Plants, Destelbergen, Belgium.
SAAB:	South African Association of Botanists
SAASTEC:	Southern African Association of Science and Technology Centres
SALI:	South African Landscapers Institute
SANA:	South African Nursery Association
SERA:	Southern Education Research Alliance
UK:	United Kingdom
UN:	United Nations
UPOV:	International Union for the Protection of New Varieties of Plants
USA:	United States of America

CHAPTER 1

INTRODUCTION

1.1 Rationale of the study

Over the ages, plants have been sources of food, fibre, shelter and medicine for human beings and animals. In a world marked by growing urbanisation the plants growing in our apartments, homes, gardens and in the green stretches of our urban habitats are often the only contact city-dwellers have with nature. Plants in general, and ornamental plants in particular, delight the senses, beautify our surroundings, add economic value to them and have the ability to induce a sense of tranquillity, comfort and well-being (Harris, 1992:4).

Most people seem to have an intrinsic need to connect with nature, and plants exercise a strong, positive influence on human behaviour (Kaplan & Kaplan, 1989:173; Harris, 1992:11; and Lohr & Relf, 1993:106). Ornamental plants thus enhance our surroundings physically, psychologically and economically.

For all the benefits and enjoyment that plants bestow upon the human race, they come at a price. There is, of course, the initial cost of acquiring and planting them, followed by the cost of their upkeep for as long as they live or for as long as we have need of them. Some plants grow easily from seed or cuttings and require little or no care thereafter. Growing and maintaining other types of plants may, on the other hand, be expensive and time-consuming. All over the world, more and more public and private gardens are being created, sometimes requiring great capital outlays, while at the same time the costs of tending them keep on rising: It follows, therefore, that selecting the most suitable ornamental plants from the outset has become a matter of economic necessity, as has containing the cost of their subsequent care (Harris, 1992:4).

It is estimated by Simpson & Ogorzaly (2001:1) that there are roughly 300 000 plant species on earth, of which mankind, during the course of its history, has been using about 2 500 as food plants. Of this number, these authors estimate that in our present modern day world only about 150 plant species are being cultivated commercially for food production. In contrast, the ornamental plant industry is marked by immense diversity. Cultivation programmes have produced vast numbers of new ornamental plant cultivars with the result that thousands of species and cultivars are readily available nowadays (Brickell, 2001:159). Interestingly enough, more ornamental plant species and varieties are being cultivated all over the world today than the combined number of all other agricultural and horticultural crops put together (Halevy, 1999:407). According to some estimates, around 150 000 ornamental plant species and cultivars are currently in commercial use (Brickell, 2001:159).

Today there exist many alternative sources of new plants for horticultural use other than plants occurring naturally in the wild (refer to Section 3.5 of this study). Whatever sources of new plants are used, the criteria for their selection need to be rigorous in order to ensure that such new plants meet the required standards of horticultural performance, consumers' needs and the anticipated market demand.

Human beings from all cultures have complex physical, emotional and intellectual needs. A human need such as aesthetic appreciation must perforce be factored in when considering the ideal attributes required of ornamental plants. To this should be added the mounting pressures exerted by progressive global movements advancing the causes of environmental awareness and humanitarian compassion. These trends may in future exert an even stronger influence on the selection and application of ornamental plants than they are already.

As a result of the human need that ornamental plants should satisfy breeders, cultivators and nurseries take into account the economic feasibility of launching new plant products on the market. According to Von Hentig (1998:65), the route a new plant has to follow from its discovery to its final destination can often be long, arduous and expensive. The various production and marketing stages could include sourcing the plant from its original, often remote, pristine location, its further development at a research station, followed by mass reproduction in nurseries, moving through a network of wholesale distributors and retail outlets before reaching its new home. New plant introductions are usually accompanied by some form of promotional marketing to help the new recruits gain acceptance from their intended end-users.

In researching the many processes involved in selecting ornamental plants for horticultural use and the market forces to which they are subjected, the researcher discovered a number of aspects that required further exploration and clarification for the benefit of scientists, producers, wholesalers, landscapers, retailers and end-users. This study is intended to identify and describe those questions, with particular emphasis on indigenous South African plants, as well as to make recommendations for the more extensive ornamental use of such plants.

In the course of her professional career the researcher has been struck by the relatively few genuinely new ornamental plants which are appearing on the local market nowadays, and even fewer still from our own world-renowned, richly diverse floral kingdom. This raised the question whether this assumption was indeed true, and if so, whether researchers, such as myself, could find explanations for this state of affairs and come up with workable solutions to remedy it.

1.2 Statement of the main problem

Problematic selection issues in respect of sourcing new ornamental plants for the South African markets from the indigenous flora arise when using only the physical characteristics of plants. There are important consumer needs that are not sufficiently met by growers, and growers' issues that are not sufficiently addressed by the research institutions and in the selection processes that may require attention by the growers and research institutions in the sourcing of new ornamental plants. In addition, there are a number of factors limiting the range of horticultural uses of indigenous plants in South Africa. The use of indigenous plants is also subject to competition from exotic plants in the market.

1.3 Statement of the sub-problems

The main problem can be addressed through deconstructing it into three sub-problems as follows:

1.3.1 Sub-problem 1

Identifying the problematic issues related to the criteria for selecting indigenous South African flora as new ornamental plants in horticultural applications and producing solutions to overcome or mitigate their effects.

1.3.2 Sub-problem 2

Establishing whether growers and breeders of indigenous plants for horticultural use are responding adequately to meet new market opportunities caused by changing trends in the horticulture industry.

1.3.3 Sub-problem 3

Identifying the restraining factors inhibiting a more extensive use of indigenous South African flora in horticultural applications, such as, for instance, the competition they face from exotic plants.

1.4 Hypotheses

Three hypotheses are raised hereunder, each responds to the three sub-problems stated under Section 1.3 above:

1.4.1 Hypothesis 1

It is postulated that appropriate selection criteria can be formulated (a) to meet the needs of consumers when considering the acquisition of new indigenous plants for horticultural use, as can be selection criteria (b) to meet the needs of growers either when making decisions at the onset of research programmes for the development of new horticultural crops of indigenous plants, or when sourcing new plants from the wild.

1.4.2 Hypothesis 2

It is postulated that the extent of the untapped market potential for horticultural applications of indigenous flora in South Africa is large enough to warrant the introduction of new indigenous and new special purpose plants to the market.

1.4.3 Hypothesis 3

It is postulated that a number of restraining factors are inhibiting a more widespread use of South African indigenous flora in horticultural applications, such as, for instance, competition from exotic plant species, resulting in the

underutilisation of indigenous plants, and, furthermore, that this apparent underutilisation is of a sufficient magnitude to warrant a comprehensive investigation in order to find means of possibly ameliorating the *status quo*.

1.5 Research scope delimitations

1.5.1 The scope of this study is limited to an investigation of sourcing and selection considerations in respect of using indigenous South African flora as ornamental plants within the context of the formal, commercially-based horticulture industry.

This study was not intended to cover sectors of the industry where indigenous plants may well find other applications or informal sectors that fall outside the commonly conceived ambit of the commercially-based horticulture industry.

1.5.2 The study is confined to ornamental indigenous plants used for outdoor gardening and landscaping, but may include references to indoor plants and utilitarian plants such as food and medicinal plants, where apt and appropriate.

1.5.3 Although this study is primarily concerned with the indigenous flora of South Africa, it may contain references to exotic plants to illustrate a point.

1.5.4 This study does not purport to offer any legal, philosophical or ideological opinion on any matter contained herein or to set any environmental, technical or commercial specifications, but may refer to such matters by way of example.

1.6 Assumptions

1.6.1 It is assumed that exotic plants make up the majority of ornamental plants in use in South Africa today and that they will continue to hold their position of

preponderance for the foreseeable future.

- 1.6.2** It is assumed that new ornamental plants of both exotic and indigenous origin are being introduced to the South African market from time to time, and that this trend will continue for the foreseeable future.

This study will, among other things, test the validity of both the assumptions described above.

1.7 Objectives

- 1.7.1** This study sets out to describe the history of ornamental plants and their intrinsic value to humankind, in order to provide a general background to the examination of the central question as stated in its title.

- 1.7.2** The study will identify sources of new ornamental plants in South Africa, with special reference to sourcing ornamentals from indigenous flora.

- 1.7.3** The study will identify and discuss the market forces that govern the trade in ornamental plants in general and indigenous ornamentals in particular.

- 1.7.4** This study is intended to develop appropriate criteria for the selection of new ornamental plants sourced from indigenous South African flora and to produce proposals for their effective application in this country.

1.8 Research methodology

1.8.1 Introduction

The purpose of this section is to describe the research design and methodologies used for this study and the reasons for using them.

Included in the discussion is an explanation of the methods employed for the collection of the data and their analysis which produced the quantified results needed to deal with the main problem and its sub-problems.

Scientific knowledge presupposes that the body of knowledge presented as such was accumulated by means of inquiry, conducted in terms of specific principles of reasoning, and through which observable, empirical and measurable evidence was gathered (Newton, 1999:794-796). It is now generally accepted that what is termed “the scientific method” consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses (Merriam-Webster, 2011). Scientific knowledge is therefore the product of rigorous, methodical and systematic inquiry. It rejects mere opinion in favour of demonstrable proof and is inherently critical of all untested assumptions and theories (Babbie & Mouton, 2002:16).

Natural science studies concern themselves with the physical and material world: Botany is the study of plants. On the other hand, social sciences, such as Sociology or Business Administration for example, deal with the study of people, their beliefs and convictions, the forces that influence their behaviour and their interaction with each other and their surroundings within given contexts of society. According to Neuman (1997:6), social sciences are sometimes referred to as “soft sciences”, not because their study lacks rigour, but because their subject matter, human social life, is fluid, difficult to observe and measure with the same degrees of precision usually associated with the natural sciences.

Consequently, the subject matter of any scientific enquiry, whether directed at human behaviour or biological organisms, determines the methods, techniques and instruments that will be used for gathering and measuring evidence. People’s attitudes which shape their behaviour are,

for example, sometimes best established using surveys, while the study of micro-organisms may be effectively pursued by using microscopes.

Scientists engaged in both the natural and social studies typically gather data using specialised techniques and then interpret the empirical evidence provided by the data to find out whether they support a given theory or not. Depending on the type of scientific enquiry, researchers could elect to use either quantitative techniques (producing data expressed in numbers), or qualitative ones (producing data expressed as words, pictures, objects), or a combination of the two (Neuman, 1997:7).

Neuman (1997:9) therefore holds that the term “scientific method” encompasses a plurality of ideas, rules, techniques, methods and approaches employed by the scientific community in the course of their investigations.

This research touches upon two main areas of scientific study, namely the natural science of Botany and that of human social behaviour within a defined context: In the first case, it involves the study of the physical attributes of plants, and in the latter, an inquiry into the causes of particular types of human behaviour resulting in the selection of certain plants.

According to Neuman (1997: 19-20), descriptive research (also known as statistical research) is intended to describe the characteristics of a given social setting and the dynamics which govern it; this type of study is often undertaken to guide policy and business decisions. Descriptive studies may therefore produce very detailed results. For instance, they may indicate the percentage of the members of a target population who hold a particular view or engage in specific types of behaviour, e.g. 10% of customers of a retail garden centre may specifically ask for indigenous

plants (see also Question 4 of the questionnaire for this study, in Addenda A and B).

Neuman (1997:20) thus contends that researchers are more often inclined to use descriptive research methods to find answers to the “who” and “how” types of questions and to create a reliable description of how things are at a given moment. The data-gathering techniques used for conducting descriptive research include such tools as surveys, field research, and historical-comparative research. Content analysis is done on all these techniques.

The purpose of social research determines the scientific approach adopted for a particular study. Neuman (1997:21) describes two different approaches: (a) basic research (also called academic research or pure research) aimed at developing an understanding of the fundamental nature of a particular social reality and (b) research aimed at producing knowledge for practical application to a specific question, like how to remedy a defined problem. He states that applied research frequently equals descriptive research, and that the main advantage of this type of research is that its results can often find immediate practical use. The outcomes of applied research may, for example, serve as grounds for deciding to market a new product or for favouring one policy over another. Bearing in mind the potential practical applications of their work, those engaged in applied research should decode the specialised scientific language in which their findings are usually cast into a form of communication which decision-makers and other practitioners will be able to understand (Neuman, 1997:22, Silverman, 2005:109).

The type of research approach chosen for this study is one of applied social research which was used to describe the particular set of issues related to the perceived problems encountered when selecting ornamental

plants from indigenous South African flora for horticultural use. This approach was also employed to provide an account of the ornamental plant industry as background, its impact on the problem areas under investigation and to guide the overall research effort.

1.8.2 Research methodologies

Researchers usually employ one or more techniques to collect data. Collecting, analysing and interpreting data may involve the use of either quantitative or qualitative methods, or both. The choice of technique is most often dictated by the nature of the study area about which data are to be gathered and their intended purpose. This implies that some techniques may be better suited for certain applications than others (Neuman, 1997:30).

According to Neuman (1997:30-32), quantitative data can be gathered by the following methodologies:

- *Experiments*: Experimental research uses the logic and principles found in natural science research and may be conducted in laboratories or in real life.
- *Surveys*: Someone conducting research by means of a survey usually asks a group of people, representative of a larger target population, to respond to questions set out in a survey, either in writing or verbally during an interview. All responses are recorded in writing. The researcher is not supposed to manipulate respondents into giving responses to any question other than their own. The survey should contain enough properly framed questions and solicit responses from enough people over a relatively short space of time in order to obtain the most statistically reliable results.

Responses to a survey are usually reworked into graphs, tables and/or percentages, indicating trends such as respondents' preferences, levels of satisfaction with a given product or situation, probable courses of action and likely modes of behaviour.

- *Content analysis:* Content analysis is a technique for examining the contents of a communication contained in some written, aural, visual or symbolic form, such as laws, song lyrics, pictures, films, and signs.
- *Existing statistics:* Existing statistics research methodology is used when a researcher examines a source of previously collected information, and then reorganizes or combines the information in new ways to address a research question.

According to Neuman (1997:32-34), qualitative research can be conducted through the following methodologies:

- *Field research:* In natural sciences, a field study means an investigation conducted in a geographical area instead of a laboratory. In social sciences, field researchers conduct case studies on small groups of people over more or less protracted periods of time, based on a loosely framed idea or premise. Researchers naturally interact with those in the target group and get to know them. Much of the results obtained through field researches are usually based on the researchers' observations of the target population, on interviews with small groups or individuals and on their overall experiences of the target group and its setting or location. The duration of such research may last a few weeks, months or even years.
- *Historical-comparative research:* This research examines aspects of social life from a bygone historical era, with a view of learning lessons for possible application in the present. Researchers often use a mix of

evidence, including statistics, documents, old and new sources of record, such as books, newspapers, magazines, reports, diaries, photographs and maps, observations and interviews to produce evidence for their investigations.

Denzin & Lincoln (2008:3) hold that qualitative research is a method of inquiry in its own right. It is a method of inquiry used in many different academic disciplines and for many purposes. Interpretative analysis is applied to typical techniques including case studies, participatory enquiry, interviewing, participant observation, and. Qualitative researchers aim to gather a thorough understanding of human behaviour and the reasons for them. Qualitative researchers study things in their natural settings and attempt to interpret the phenomena they come across in terms of how they govern human behaviour (Denzin & Lincoln, 2008:4).

Qualitative research is directed at examining the qualities of entities, processes and social dynamics that cannot be tested or measured by way of experiment in terms of quantity, volumes, amounts, intensity or frequency of occurrence. Qualitative research (as opposed to quantitative research) may therefore be used to measure and analyse the causal relationships between variables by offering explanations of the “how” and “why” questions related to patterns of human behaviour (Denzin & Lincoln, 2008:14).

The best way to distinguish between quantitative and qualitative methods of research is to consult the comparisons between the two as compiled by Neuman (1997:14) and reproduced in Table 1.1.

Table 1.1 A comparison of the quantitative and qualitative methods of research (Neuman, 1997:14)

Quantitative method	Qualitative method
Measures objective facts	Reflects social reality, conveys cultural meaning
Focuses on variables	Focuses on interactive processes, events
Reliability is key	Authenticity is key
Conducted in a “value free” manner	Values are stated and assessed
Independent of context	Situationally constrained
Many cases, subjects	Few cases, subjects
Statistical analysis	Thematic analysis
Researcher is detached	Researcher is involved

Quantitative investigations usually tend to be couched in simple, non-technical language in order to more effectively fulfil their purpose. So too then should be the researchers’ reports on their findings, if the latter is to have any utility to a wider end-user readership.

According to Denzin & Lincoln (2008:31), a qualitative researcher is guided by his or her principles that are made up of a combination of beliefs about ontology (what kind of being is the human being? what is the nature of reality?), epistemology (what is the relationship between the inquirer and the known?) and methodology (how do we know the world, or gain knowledge of it?). During the research process this combination of a researcher’s subjective beliefs unavoidably then proceeds to set the various discourses within which he or she frames the investigative enquiry, interprets the research results and determines how he or she is guided in reaching conclusions.

It is generally accepted that researchers should endeavour to remain as objective as possible when conducting their research and divorce themselves from any personal bias when interpreting their observations and in reaching their conclusions (Leedy & Ormrod, 2001:147). The authors cited contend that while absolute objectivity in research may be called for when studying physical phenomena, it may not be appropriate or even possible when investigating human phenomena.

According to Neuman (1997:68) interpretive social science is related to hermeneutics, which means to “make the obscure clear”. Neuman (1997:68) states that positivist researchers have a preference for precise quantitative data and rather use experiments, surveys and statistics. They seek rigorous, exact measures and employ “objective” research methods. In terms of a positivist approach, hypotheses are tested by careful analysis of the numbers produced by the research methods, whereas an interpretive approach will seek a systematic analysis of meaningful social activity through direct, detailed observation of people in their natural settings. The advantage of an interpretive approach is that it enables researchers to better understand how people create and maintain their social worlds and to better interpret the associated social dynamics.

Neuman (1997:71) states that positivist researchers evaluate theories by using set procedures to test a given hypothesis. They make logical deductions from the theories being tested, gather data and analyse the evidence in such a manner so that the process may be replicated by other scientists. One of the final tests of the validity of their findings is thus whether the process of explanation may be replicated.

The researcher therefore wishes to acknowledge that her qualifications and experience may indeed be the cause of some bias and subjectivity in designing the research, the drafting of the survey questionnaire and in the

final interpretation of the research results.

In order to reduce the risk of subjectivity, it is a wise policy that researchers should make their observations of inquiry from multiple platforms, using a variety of techniques and methodologies to collect and interpret the evidence for their studies. Neuman (1997:151) also supports the idea that one should indeed use different research methods. Triangulation in its purest scientific meaning is therefore a means of reducing the degree of subjectivity on the part of the researcher to the point where it would not compromise the validity of the research or its results.

Cross-checking research results may be achieved by using qualitative and quantitative methods of research and data collection, even if there are some distinct differences between the two methods, as pointed out in the preceding discussion (Neuman, 2000:125).

The researcher used two methodologies, namely a qualitative and a quantitative approach. By using these two methods in conjunction with each other, their different, yet complementary strengths made it possible to produce a study providing workable, reliable answers to the questions it had set out to investigate, while reducing the risks of subjectivity and personal bias clouding its final outcome.

The researcher believes that she has been able to construct a balanced, eminently feasible and sufficiently broad-ranging approach for the conduct of her research of the subject at hand which, in the end, delivered conclusive evidence in support of the hypotheses posited as the reasons for undertaking this study.

1.8.3 Qualitative research methods used for this study

1.8.3.1 A review of the literature

The formal start of this study consisted of a study of publications related to ornamental plant selection in order to collect information on such selection questions that may be regarded as problematic among botanists, horticulturists, landscape architects and landscape contractors, ornamental plant growers, plant retailers and consumers. The sources included local and foreign publications from the world of science, technology, commerce and those devoted to covering popular lifestyles.

These sources provided substantial data for defining the scope of qualitative research required by this study.

1.8.3.2 Field research

In addition to consulting published sources, the researcher relied heavily on the data she gathered by means of field research. The field research consisted of visits to commercial growers and nurseries, research stations, indigenous plant collectors, botanical gardens, and a number of private and public gardens in South Africa and abroad. The researcher's field research was augmented by her attending various national and international horticulture trade fairs and academic symposia about ornamental plants and related matters. During these excursions, the researcher took extensive notes and photographs to record her observations which data were subsequently used for this study.

The researcher also availed herself of opportunities presented by these field trips to conduct formal and informal interviews with selected experts and interest groups. The researcher used a

purposive sampling method to choose the most useful people to interview. Purposive sampling is used as a non-random instrument to gain access to the views and opinions of a specific sub-set of people (Neuman, 2000:517).

Interviews are a valuable tool when conducting phenomenological research as part of qualitative research. Phenomenological research is described by Leedy & Ormrod (2001:153) as a study that attempts to understand people's perceptions, perspectives and understanding of a particular situation. The evidence of how various individuals see things can then later be organised into a collection of related ideas or views to build up a holistic, comprehensive understanding of the subject being investigated.

Using focus groups can produce useful research data when conducting qualitative research. It is a cost and time-efficient manner of data-collection, because of the volume of evidence that can be gathered by interacting with a group of people instead of just one individual at a time.

A focus group is typically a fairly informal meeting of a small group of people assembled for the purpose of talking to a researcher about their perceptions, opinions, beliefs and attitudes towards things like a product, service, advertisement, concept, idea or policy. During the focus group session participants are free to give their opinions on virtually any matter. Useful data may be collected from such group discussions, because the respondents often react to the remarks made by other participants inasmuch as they stimulate their memories and trigger ideas as one train of thought sets in motion the development of another (Lindlof & Taylor, 2002: 182)

The focus groups interviews used for purposes of this study were indeed conducted in a semi-formal manner and their purpose was to obtain answers to pre-set questions, as well as to stimulate an exchange of views on ornamental plant selection between the researcher and those being interviewed.

The researcher compiled a list of problematic questions about plant selection, based on her own professional experience and her study of various publications on the subject. Respondents interviewed in the focus groups consisted of experts in the fields of indigenous flora and ornamental plants. Their responses, as recorded and evaluated by the researcher, generated a considerable body of qualitative data for this research.

The material obtained through the focus group technique was further augmented by the researcher's observations while visiting various research institutions and other events.

1.8.4 Quantitative research methods used for this study

In order to validate the results obtained during this stage of the investigation, a broad-based survey was undertaken which involved respondents from garden centres, nurseries, landscape architects and landscape contractors. These respondents' intimate knowledge of consumers' gardening and plant preferences ensured that the data produced with their help were useful and reliable.

The survey was designed as a descriptive form of research. Leedy (1985:134) cautions us about potential distortions that may be caused by personal bias when using descriptive survey research. Some bias-induced distortions may have occurred in the framing of the survey questions on problematic selection criteria for ornamental plants which could, in turn, have

lead to distortions of the survey results and their subsequent evaluation. Although one cannot completely eliminate personal bias, this researcher was mindful of the risks and tried to minimise them.

Quantitative research stresses objectivity by using the principles of standardised methodological procedures, quantitative measurement and methods of statistical data analysis.

Neuman (2000:34) explains that a survey technique normally consists of a written questionnaire which selected groups of respondents are asked to answer. Answers may be recorded in percentages, tables or graphs. Surveys provide researchers with a tool to gain insight into respondents' opinions, experiences, preferences, expectations, activities and lifestyles. Results obtained from sampling a small group, representative of a specific target population, are usually extrapolated to reflect the views, wishes, activities and likely behaviour patterns of the entire target population.

According to Leedy (1985:173), statistical analysis is undertaken to probe the data for information, meaning, trends, potentialities and dynamic forces present within the target population. Since significant bodies of data collected for this study were quantitative in nature, their analysis required appropriate statistical tools such as described by Field (2009). Descriptive statistics such as frequencies and cross-tabulations were calculated. The reliability of the data was evaluated by the Cronbach's alpha. In cases where the Cronbach's alpha indicated inconsistencies the scales were reversed (Field, 2009). Factor analysis was performed to try and find underlying latent variables, which were used for dimension reduction of data. The means of certain constructs were compared across demographic variables by means of ANOVA (Analysis of variants) (Ho, 2006:240).

Leedy (1985:135) finds the survey questionnaire to be an appropriate

research instrument of gathering data beyond the physical reach of the researcher. Because of their advantages, such as ease of administration and cost-effectiveness, survey questionnaires are popular methods of data collection (Neuman, 2000:271). Ease of administration also means that research surveys can be used to reach target populations spread over wide geographical stretches.

In this study, the problematic issues of ornamental plant selection, first identified through qualitative research, were later tested for validity against the quantitative evaluation of the data collected through two survey questionnaires completed by a range of carefully chosen respondents all over South Africa. The respondents were selected as representative of the larger target groups (populations) and whose work, knowledge, interests and experience had a special bearing on this study.

The reason for creating two questionnaires was to tailor the research enquiries according to the different types of expertise held by the two main target populations selected for questioning: The first questionnaire was submitted to growers and scientists in the field of horticulture and the second to ornamental plant retailers and those with knowledge of landscaping.

The responses gathered through the surveys were subsequently collated and statistically analysed to provide data, recorded in percentages, on the relative importance of the various factors identified as relevant in ornamental plant selection. The methodologies used in compiling and pre-testing the questionnaires are described Chapter 4, Sections 4.2.1 to 4.2.4.

The quantitative data, taken together with the qualitative data, ultimately provided the basis for the formulation of this study's findings, its conclusions and recommendations, as set out in Chapter 5.

1.8.5 Summary of the research design

The research design for this study may be summarised as follows:

- A literature review to identify and analyse available information on ornamental plant selection issues that may be regarded as problematic to botanists, horticulturists, landscape architects and landscape contractors, ornamental plant growers, plant retailers and consumers.
- Field research over the past 18 years which allowed the researcher to make observations and gather information during her visits to various research centres and other institutions and by attending specialised events and symposia.
- Research by survey questionnaires to obtain quantitative data to describe the nature of each of the problematic selection criteria for ornamental plants that had been identified, as well as to determine the relative importance of each. These criteria had previously been identified and described based on the qualitative data gathered through a study of relevant published sources, through subsequent interviews, the inclusion of additional criteria proposed by horticulturalists, as well as problematic issues identified by interest groups.
- These quantitative data sets were then used to formulate findings, draw conclusions and make recommendations.

1.9 Importance of the study

This study is important because it addresses a problem that has been developing in the horticulture industry over some time, namely the proper

selection of the most appropriate plants from indigenous South African flora for ornamental use. The use of South African flora has in recent times increasingly come under the spotlight as an economic resource for further commercial exploitation and more job creation. It is hoped that this study will contribute to expanding the commercial use of South Africa flora, and so increase the economic value that may be extracted from this natural resource for the ultimate benefit of all the people of this country.

The outcomes of this study should also be particularly helpful to practitioners in the horticultural and landscaping industries, inasmuch as these outcomes could enable them to better respond to the needs of growers and consumers in selecting ornamental plants from indigenous South African flora. In the interest of greater utility, the study also deals with some of the inherent limitations in the use of indigenous South African plants, difficulties associated with introducing new ornamental plants to the market, and the commercial competition they face from exotic plants.

The results of this study may furthermore find useful applications in education and conservation.

1.10 Layout of the thesis

Chapter 1 consists of the introduction to the study, the statement of the main and three sub-problems and the three hypotheses that were formulated in response to these sub-problems. The delimitations of the study explain the parameters within which it was conducted. Chapter 1 also describes two key assumptions that were made and which had to be validated, or otherwise, by the research.

Further in the chapter, the goals and objective of the study are set out, followed by a discussion of the research methodologies used. The chapter

ends with an overview of the importance of the study to the ornamental plant industry in South Africa.

In Chapter 2 the ornamental plant environment is discussed in greater detail. Included in this part of the research is an account of the history of ornamental plants and a discussion of their intrinsic value to mankind. These two expositions are intended to provide a fitting background perspective on ornamental plants against which this study has been undertaken.

Chapter 3 deals with the history of horticulture in South Africa and selected other countries in order to identify those key considerations that have influenced ornamental plant selection over the ages. These key considerations were subsequently analysed in order to discover those enduring factors which may still be relevant to the horticultural use of indigenous plants in the South African context today, and possibly into the future. The conclusions reached after an examination of these factors were used to formulate a response to this study's problem statement and to validate, or otherwise, the ensuing hypotheses. In Chapter 3 a number of problematic issues related to ornamental plant selection have been identified.

The purpose of Chapter 4 is to describe how the quantitative data were gathered about these issues by means of an analytical survey questionnaire, and the subsequent analysis of the data.

The survey questions were structured to yield comparable data between the various data categories. The purpose of the statistical analysis was to reveal trends so as to enable the researcher to make findings and draw conclusions about the focus areas of this study, as well as to justify recommendations and identify problem areas that require further examination.

The methodology to be used in compiling and pre-testing the questionnaires is described in Sections 4.2.1 to 4.2.4.

The responses to the survey questionnaire are presented in Addenda D, E, F, G, H and I.

Chapter 4 continues by describing how these responses were collated and statistically analysed to provide data on the relative importance of each in determining ornamental plant selection.

This is followed by an exposition of how the quantitative data, together with the qualitative data (see Chapter 3) were used in order to arrive at the conclusions and formulate the recommendations of the study which are set out in Chapter 5.

The purpose of Chapter 5 is to demonstrate the varying degrees of influence and relative importance of those factors and considerations, covered by the research survey, in determining ornamental plant selection in South Africa. The data used to accomplish this task were gathered from the statistical analysis of responses to the survey. The data were also used to provide answers to the main problem and three sub-problems as formulated in Chapter 1 of the thesis, and, by logical progression, to test the validity, or otherwise, of the three hypotheses postulated in that chapter.

CHAPTER 2

BACKGROUND TO THE STUDY

2.1 Introduction

In this chapter a historical background and time frame to the use of ornamental plants over the world in general, and in South Africa specifically will be given. The fundamental value of ornamental plants in human life will be investigated and discussed with the purpose of enlightening why we acquire ornamental plants.

2.2 A brief historical overview of ornamental plant use

2.2.1 Introduction

Since the earliest times, humans have cultivated food plants, especially wheat and grain. According to Simpson & Ogorzaly (2001:42), the practice of agriculture seems to have begun simultaneously about 10 000 years ago in many different parts of the world. At the time, survival was of primary concern and it is highly unlikely that plants would have been grown simply for their ornamental value. As civilisations developed, plants were discovered and collected from the wild for uses other than food.

According to Simpson & Ogorzaly (2001:419), the cutting of flowers and foliage for personal and ceremonial use dates back to prehistoric times. Excavations of Palaeolithic burial sites have shown that sprigs of flowers placed around bodies were important for burial rites. Most edible crops were introduced into cultivation thousands of years ago. There are only a few new edible plants in the contemporary western world such as pecan, blueberry and

kiwifruit, but even these plants have been cultivated since ancient times by local farmers in their native region. This is not the case with ornamental crops. According to Halevy (1999:407), many of the commercial cut flowers, pot plants and garden plants were not cultivated commercially until a few decades ago.

Although human appreciation of plants is probably inborn, the ability to exploit plants so successfully is in large part a result of the human's unique capacity to transmit knowledge culturally. Plants were tried and discarded, or added to the repertoire of those already used. Because different kinds of plants were available in different parts of the world, various peoples built up their own inventories of useful plants.

Once people began to use some species of wild plants preferentially over others or to sow the seeds of selected individuals, they began to alter the plants used. Wild sources have been largely abandoned in favour of species that humans were able to modify into particularly productive or pleasing crops. This trend has led to the present situation, in which only about 20 species, all highly modified by humans, are of major economic importance. For example the most important cereals are barley, maize, millet, oats, rice, rye, sorghum and wheat (Simpson & Ogorzaly, 2001:1).

On the contrary, the ornamental plant industry is characterised by its great diversity. There are more ornamental plant species cultivated today than all other agricultural and horticultural crops combined. In some ways the introduction of new ornamental crops is easier than for edible crops. Neither their nutritional value nor their potential toxicity to humans has to be considered (Halevy, 1999:407). Vast numbers of new cultivars have resulted from breeding programmes and many thousands of species and cultivars of ornamental plants are commercially readily available today.

The staggering number of horticultural plant species in existence nowadays may best be illustrated by reference to the 2012-2013 edition of the *Royal Horticultural Society Plant Finder* which lists over 70,000 plants available in the United Kingdom alone (<http://apps.rhs.org.uk/rhsplantfinder>) accessed 12/04/2012). On top of this, it is estimated that across the world there are probably as many more types of plants grown for the production of cut flowers, as pot plants and from seed that are not included in the RHS catalogue or in any other similar publication (Brickell, 2001:160).

2.2.2 The beginnings of plant utilisation as ornamentals

From early times, different cultures have adopted diverse species as favourite ornamental plants and have developed personal styles in the use of cut flowers. The cut flower market today is increasing globally and is growing at the rate of 6 – 9% per year (Cadic & Widehem, 2001:76; Simpson & Ogorzaly 2001:419), with a turnover in Europe of approximately € 37 bn in 2001 (Cadic & Widehem, 2001:76).

The development of gardens, however, had to wait until humans were settled. Only once people have settled in one place can they lay out, plant and tend the flowers and trees of a garden. Horticulture represents a primary, essential element of civilisation, and civilisation and urbanisation are almost synonymous and go hand in hand. It has been pointed out by many authors that the cultivation of gardens requires people to have ceased a nomadic way of life and settled in one place. Conversely, it is virtually impossible for people to settle in one place without cultivation (Burchett, 1995:81; Simpson & Ogorzaly, 2001:402). It follows that the production of ornamental plants on a commercial basis is a product of urbanisation.

It is even said that all gardens are the products of leisure; it is no good looking

for gardens in a society where humans need to survive. In other words, horticulture has to be understood as an expression of the desire to improve the quality of human life, and may include everything from producing a steady, secure supply of selected and improved fruit and vegetables, to the concentration of beauty in one place which the cultivation of a beautiful garden brings about (Burchett, 1995:81).

Gardens throughout history have been designed and used for a variety of both practical and spiritual purposes (King, 1985:1; Burchett, 1995:81) which include:

- Cultivation of food and medicine.
- Provision of pleasure and enjoyment – with beauty and fragrance.
- Creation of idealised landscapes – to symbolise religion, philosophy and aesthetics.
- Display of wealth and well-being.
- Contrasting wilderness with order – by creating order from wilderness.
- Satisfaction of intellectual needs – for rare and unusual plants.

Gardens of an age express an image of paradise for the people who create them at the time. Consequently, the historical development of gardening styles often paralleled that of the philosophical thinking of civilisations. Similarly, those of previous cultures have shaped the roots of modern landscaping ideas (Simpson & Ogorzaly, 2001:402). All design derives from impressions of the past, and the modern collective landscape, conscious or subconscious, from historic gardens and parks and silhouettes, which may have been created for totally different social reasons. Often only the small private garden remains true to its instinctive unchanged purpose of expressing, protecting and consoling the individual (Jellicoe & Jellicoe, 1995:7).

Flowers, fruits and leaves have been used as ornaments for thousands of

years, and two very different concepts of gardens have existed in the East and West. The Chinese cultivated food and medicinal plants in enclosed garden areas four centuries before their Egyptian counterparts. Although both Egyptian and Chinese gardens were precisely designed, the visual effect of Chinese gardens was completely different from that of Mediterranean plantings. The Chinese were the first people to create true pleasure gardens and by 190 BC they were constructing extensive parks and public gardens. The Chinese considered landscaping a fine art interrelated with poetry and landscape painting, and conceived of the plants they used as symbolic rather than architectural objects (Simpson & Ogorzaly, 2001:409).

The idea of keeping plants in containers seems to have evolved from the development of ornamental gardens, of which the first were probably designed 5000 years ago for the palaces of the ancient Chinese civilisation (Simons & Ruthven, 1995:17).

The first true Western gardens were planted in ancient Egypt. Egyptian interest in botany and gardens is well documented in wall paintings and hieroglyphs drawn as early as 2200 BC. The Egyptians independently developed the concept of the garden as an enclosed space, they surrounded their houses with garden walls to keep out intruders and provide protection from desert winds. The geometric, stylised forms of the paths and planting beds were consistent with the formal architectural style of other forms of Egyptian art. In their search for plants to use in their gardens, the Egyptians organised the first plant-collecting expeditions (Simpson & Ogorzaly, 2001: 402-403).

The earliest plant hunting expedition recorded is one authorised by Queen Hatshepsuth of Egypt in 1495 BC. A party was sent to Somalia to bring back living plants of “incense trees”, possibly myrrh, *Commiphora myrrha*. The motive could have been for its economic rather than ornamental potential, but

soon plants were collected for other reasons as well (Brickell, 2001:159).

The formal Egyptian garden concepts spread to Syria, Persia and other parts of the Western world. In Persia, autocratic rulers ordered their subjects to plant groves of trees that became pleasure gardens and hunting preserves. These gardens were the forerunners of modern public parks (Simpson & Ogorzaly, 2001:403).

The Roman Empire lasted long enough for the development of a distinctive style of garden art. They drew ample inspiration for their gardens from the tales brought back by soldiers from other parts of Europe, western Asia (the orient), and northern Africa (Simpson & Ogorzaly, 2001:405). The Roman Empire was an urban civilisation, and most of its citizens lived in large city apartments. By planting window boxes and painting flowers on courtyard walls, people brought nature into this new urban world. Wealthy Romans implemented garden designs to suit the grounds of villas outside the city and, for the first time, urban planners incorporated greenbelts into city designs.

As Rome prospered the cultivation of ornamentals thrived. When Rome fell in about AD 500 horticulture declined in Europe. For the next 600 years gardening in Christian Europe was confined to monasteries, where monks planted medicinal gardens and grew altar flowers (primarily lilies and roses) (Simpson & Ogorzaly, 2001:406). The Roman Empire and Mediaeval monasteries had spread medicinal and culinary herbs throughout Europe.

During the crusades (1095-1291) interest in gardening was rekindled in other parts of Europe. The French developed their own form of pleasure gardens in the 12th century, consisting of small gardens enclosed by walls and planted with beds of flowers, clipped hedges or even mazes of trimmed shrubbery often designed to enhance their function as places to entertain ladies (Simpson & Ogorzaly, 2001:406).

As the Renaissance slowly spread across Europe, the revival of classical ideas extended from the fine arts to gardening and landscaping. The Italians began to look at plants as architectural or sculptural objects that could add perspective to garden design. Plants were regarded as building materials to create outdoor corridors, vistas and plazas on Italy's sloping hillsides. The French readily adapted Italian design to their flatter terrain, they produced elaborate formal gardens with a low, colourful display that consisted of masses of bedding plants arranged so as to form patterns. The most famous French gardens of this period are those of Versailles. In 1660 French gardening ideas crossed the English Channel and were emulated by the nobility of England. This swing towards natural expression was reflected in gardens that were reshaped with winding paths, water channels and thickets of trees and shrubs (Simpson & Ogorzaly, 2001:406).

Plants and ideas brought to Europe by explorers of the New World, Asia and Africa had a great impact on 17th century gardens. The wealthy began to maintain large private gardens in which to display new plants and animals. Public gardens such as the Royal Botanic Gardens at Kew are legacies of this era. Many species were first formally described from live specimens growing in these gardens, and in a few cases (such as coffee), seeds from plants of exotic regions grown in European gardens, were used to start plantations far from their native homes. For the most part, however, exotic plants in these gardens were like rare animals in zoos (Simpson & Ogorzaly, 2001:406).

In 1722 Thomas Fairchild published *The City Garden* in which he mentioned a number of more unusual plants such as aloes (Simons & Ruthven, 1995:18-19). As far as can be traced, the first deliberate hybrid recorded was also developed by Thomas Fairchild (1667-1729), who crossed Sweet William (*Dianthus barbatus*) with a carnation (*Dianthus caryophyllus*) to produce a sterile plant known as Fairchild's mule. By 1800 the French plant breeder André Dupont was carrying out the hand-pollination of roses. For the most

part, however, hybridisation, deliberate or unintentional, remained a haphazard affair until well into the nineteenth century, Mendel's work led to a better understanding of the genetic principles behind plant breeding (Brickell, 2001:160).

The Cape of Good Hope was still largely an untapped botanists' paradise, but 1772 was an important year in the annals of South African flora, marking the arrival of three notable men in search of botanical riches. Masson, a Scot from Aberdeen sent by Kew, and two Swedes, Sparrman and Thunberg, arrived in South Africa. With the new plant acquisitions from South Africa, Kew attained early pre-eminence in the botanical world. Later, Cape botanists started sending seeds and cuttings directly to Kew Gardens, who became the main propagators and hybridisers in the 17th and 18th centuries (Lighton, 1960:2).

The Victorians were experts of the potted plant. A change in the types of plants they kept came about in the 1850s with the introduction of gas lighting and cooking in urban homes. Hardier plants with tough, thick leaves were added to the existing collection to survive the toxic fumes of the gas. The Victorians also had fashions and crazes for plants such as ferns, and plants with coloured foliage. The houseplant fervour of the Victorian era cooled off in the early part of the 20th century, but hundreds of new hybrids appeared. In the 1930s the African violet rose to fame, and the post war 1950s saw house plants burgeon in many more homes (Simons & Ruthven, 1995:20).

In the 19th and early 20th century, the introduction of new plants reached a peak with thousands of new species arriving for cultivation in Europe from China, Japan, North and South America, Africa and Australasia (Brickell, 2001:160).

American gardens did not have their own character until the late 19th century, when the United States emerged as a major industrial power. Until that time,

gardening in North America was mostly pragmatic or copied from the homelands of the many immigrants who flooded into the United States. Cities grew to sizes never before imagined. Some cities met the demand for natural areas within urban environments by incorporating public parks into city plans (Simpson & Ogorzaly, 2001:407). Many famous large city parks, in particular Frederick Olmsted's Central Park, date from this period. Olmsted provided an environment of temporary escape from urban conditions and his vision led the American nation from the concept of isolated urban park to that of city and country as being a single design (Jellicoe & Jellicoe, 1995:281).

During the mid-1960s and onwards, with the worldwide development of horticulture, there were many changes in the industry. Several new ornamental plant breeding companies appeared, especially in the field of cut flower production (Cadic & Widehem, 2001:76). These changes took place after a long break during and after the 2nd World War, and were associated with the rising standard of life, and its demands, from the 1970s onwards especially in Europe. There was interest in Germany, but also in a number of other countries, in new ornamental plants, and especially in pot plants. Thus the search for, and development of new plants for these regions and their corresponding markets started anew (Von Hentig, 1998:65).

2.3 A brief history of gardening in South Africa

2.3.1 Introduction

The history of European settlement in South Africa begins with a garden. Jan van Riebeeck landed at the Cape in April 1652 with the aim of establishing a fresh food supply station and company garden for the ships of the Dutch East India Company *en route* to the East. Although a few indigenous, edible plants grew wild, he found virgin ground. It is with Van Riebeeck's arrival that the story of gardening in South Africa begins (Rycroft, 1981:10). Already in 1655,

with the arrival of the first apple trees imported from St Helena, the settlers started planting indigenous trees in a functional way, as hedges around gardens, to serve as windbreaks, and to keep out wild animals.

Along with his prodigious efforts to introduce fruit trees, Van Riebeeck was responsible for the successful introductions to the Cape of oaks, alders, poplars, pines and bay trees, as well as flowers such as carnations and tulips. The Cape's first appointed gardener was Hendrik Boom, who set about establishing extensive gardens, planting vegetables and fruit and timber trees, as well as herbs and medicinal plants (Parker & Malone, 2004:18).

During the governorship of Simon van der Stel (1679-1699), the Company's garden was expanded. It was composed not only of trees from abroad, but also included indigenous trees like *Virgilia oroboides* (Keurboom), *Kiggelaria africana* (Wild peach), *Brabejum stellatifolium* (Wild almond) and *Leucadendron argenteum* (Silver tree) (Rycroft, 1981:11).

The superintendent of the garden, Heinrich Oldenland, a Dane and a competent gardener, also began collecting local plants. The Governor sent live specimens and seeds of these plants to Holland.

The Governor Rijk Tulbagh apparently did not enlarge the Company's garden, but during his tenure (1751-1771) it developed from a plain fruit and vegetable garden into the beginnings of a botanical garden, where indigenous plants of interest were also cultivated. The master gardener, Jan Auge, was sent by Tulbagh on several explorations of the interior to collect plants for the garden and also, presumably, for despatch to botanic gardens in Holland (Rycroft, 1981:12).

Francis Masson was the first prominent British collector. He recorded more than 750 undiscovered plant species and collected a range of plants that transformed Kew into one of the world's greatest gardens. Cape flora such as

ericas and proteas, the well-known *Strelitzia* and geraniums and diverse bulbs including ixias, freesias and gladioli, owe their international recognition to Masson (Parker & Malone, 2004:18).

Great Britain wrested control of the Cape colony from the Dutch in 1795. Subsequent to the second British occupation in 1806, Burchell, the noted English botanist and traveller, wrote that by 1810 the Government garden contained scarcely anything but vegetables, with some remnants of indigenous plants and trees. The private gardens at Rondebosch were found planted with a selection of imported plants. Some interest in indigenous plants was also apparent among these private gardeners as *Calodendrum capense*, *Rothmannia* spp., *Strelitzia reginae*, *Vallota purpurea*, *Cyrtanthus obliquus* and *Aloe plicatilis* were also cultivated. For the next 30 years the government garden remained much the same, except for *Eucalyptus* spp. and *Oleander* spp. that were introduced (Rycroft, 1981:12).

During the late 19th century, a few commercial nurseries were established at the Cape. Charles Ayres arrived in 1876 and established a nursery in Cape Town in the following year. In 1886 R. Johnson of Rondebosch advertised 20 000 rose trees for sale. Another pioneer nurseryman was Cape Town born Robert Templeman, who is reported to have started the first private commercial seed nursery at the Cape. He offered a range of seeds for vegetables, flowers and trees, including Blue gum and Hakea. He was awarded a gold medal at the South African Exhibition in Port Elizabeth in December 1885, for an exhibit of Cape bulbs and everlastings grown in his nursery (Rycroft, 1981:14).

Before the turn of the century, there were some who realised the inadequacy of the botanical gardens in Cape Town, and the necessity of rescuing indigenous species of the unique Cape flora from the threatening danger of extinction. In 1910, Professor H.H.W. Pearson, the first Harry Bolus Professor

of Botany at the South African College, stated the case for such a garden in his presidential address at the annual meeting of the South African Association for the Advancement of Science (Rycroft, 1981:14).

Eventually in 1913, the Union government granted land at Kirstenbosch and contributed the sum of £1000 per annum for the National Botanical Garden to be established. At the same time the Botanical Society of South Africa was founded to augment the government grant towards the development of the gardens and to promote an appreciation of indigenous flora.

The National Botanical Gardens soon started developing other regional botanical gardens. These gardens specialise in plants indigenous to the area in which they are situated and they also carry out some botanical research.

Horticultural societies have played a significant role in the development of gardening in South Africa. In 1903 such societies were founded in both Cape Town and Durban. The Transvaal Horticultural Society was founded in 1907, followed by the establishment of the Pretoria Eastern Suburbs Horticultural Society in 1916, which became the Pretoria Horticultural Society in 1931. Many more horticultural societies were founded throughout the Republic of South Africa during the 1960's and 1970's. Later, specialist societies concentrating in orchids, clivias, cycads, lilies, ferns, aloes, roses and other plants were established (Rycroft, 1981:17).

South African gardening today is rooted firmly in the styles, ideas and many plants imported by the different European settlers. South Africa hosts a blend of the styles of two nations, the Dutch and the English, which are world-famous for their skill as horticulturists and their love of garden beauty. French and German immigrants also introduced favourite plants from their native countries.

2.3.2 The use of exotic and indigenous plants in South African gardens

Not many indigenous plants were used in South African gardens during the first half of the 20th century. Historically, most garden plants were exotics, and brought in from gardens in Europe, with many introductions from Australia.

Flowering trees and shrubs have always been the most conspicuous and therefore always the first and most important to be listed as outdoor garden and landscaping plants. During the 1930s the list for 'Trees and shrubs for dry localities' contained the following names (Anon, 1936:216): *Aloe bainesii*, *Aloe marlothii*, *Aloe natalensis*, *Aloe thraskii*, *Bauhinia galpinii*, *Erythrina humeana*, *Erythrina caffra*, *Euphorbia grandidens*, *Euphorbia tirucalli*, *Jacaranda* (exotic), *Pelargonium* spp., *Portulacaria* spp. and *Schotia* spp. Only one other category, 'Trees and shrubs for rock gardens' had nine out of nineteen names listed that were indigenous, namely *Aloe natalensis*, *Aloe dichotoma*, *Cotyledon* spp., *Crassula arborescens*, *Greyia sutherlandii*, *Leucosidea* spp., *Pelargonium* spp., *Portulacaria* spp. and *Protea* spp.

Van der Spuy (1967:209) commented that many overseas gardeners who visited South Africa expected to find our gardens filled with indigenous plants, but instead they came across plants of European origin. According to Van der Spuy (1967:209), the demand for indigenous plants before and during the 1960s was so low that very few nurseries found it profitable to stock them. However, plant collectors and botanists from other countries have been interested in South Africa's flora for generations.

Interest in indigenous plants as garden subjects steadily increased, especially during often dry years when these plants proved to be much better survivors than their exotic counterparts. During the 1970s an upsurge in the interest and use of indigenous plants in gardens started. It is the researcher's impression that the cumulative effect of spells of drought, the introduction of television in

South Africa during 1976 and the promotion of indigenous flora in the popular media by botanists during the 1970s and 1980s contributed largely to this appreciation and use of indigenous flora in the landscape and garden in South Africa. Pienaar (1985:5) listed 236 indigenous genera in his book *Plant Inheems* he also recommended that plants be tried outside of their normal climatic distribution range.

South Africans are increasingly realising that indigenous plants are usually better adapted to the extremes of climate and soil conditions than plants introduced from other countries. In his introduction to *The South African What Flower is That?* Pienaar (2000:6-7) mentioned that more than 500, that is to say one-third of the 1 500 plant species cultivated in South African gardens and homes, are indigenous.

According to Parker & Malone (2004:19), South African gardens did not develop their own style until the late 20th century. Gardens have shrunk considerably in size since the 1970s and many gardeners started to cultivate their plants in containers or work with smaller spaces (Parker & Malone, 2004:19). Whatever the size of the garden, gardeners continue to mix and match native and exotic plants and combine formal and informal garden designs (Parker & Malone, 2004:19).

A similar trend is discernible in the black townships of South Africa which tend to be inhabited by people at the lower end of the socio-economic scale: their gardens, however small, usually also contain a combination of indigenous and exotic plants.

However, recent research by Lubbe, Siebert & Cilliers (2010:2900) found that advances in economic empowerment among formerly disenfranchised South Africans, especially among those living in towns and cities, are leading to substantial changes in the way in which plants are used in their gardens; one

of the most noticeable changes is the increasing plant diversity adorning their gardens.

Nonetheless, marked differences in plant usage remain across South Africa: this phenomenon can be ascribed to the country's highly heterogeneous population and rich cultural mix of different beliefs and customs. According to Lubbe *et al.* (2010:2907) this means that different people invariably have different ideas about the use of land, resulting, for example, in the variety of land covers (such as bare soil, wild vegetation or cultivated vegetation) employed and which may vary from group to group.

These authors also found that the gardens of lower income households tended to contain higher proportions of utility plants, such as food and medicinal plants, than gardens in more affluent areas. They did, however, discover that the use of exotic plants was quite widespread among all cultural and income groups and that most gardeners showed a remarkable preference for hardy alien species. Plant diversity is furthermore an important feature in gardens of some low-income households as a variety of utility plants are used as sources of subsistence and extra income (Lubbe *et al.* 2010: 2907).

2.3.3 Introduced cultivated plants

The National List of Introduced Trees (Von Breitenbach, 1989:1) includes 744 species from all parts of the world. According to him (1989:2), the preserving of natural trees in rural areas lie in village woodlots of fast-growing exotic trees to produce the fuel-wood supplies required by an increasing population. Large parts of the country would be turned into desert if the introduced shade and ornamental trees were removed overnight (Von Breytenbach, 1989:2).

Most of the better-known street, park and garden trees have a long history of selective breeding. According to Von Breytenbach (1989:2), indigenous trees

cannot suddenly replace them because they are wild trees, the majority of which still need considerable time to be domesticated for utility and ornamental purposes. A number of the introduced tree species have become invaders, such as certain wattles, pines and hakeas (Von Breitenbach, 1989:2).

Glen (2002:i) compiled a database of almost 9 000 varieties of plant known to have been cultivated in South Africa, or of which cultivation has been attempted here by recording some 37 0000 specimens. Cultivated plants now cover a large portion of the world's arable land. They form the basis of human subsistence. Ornamental plants, a subset of these economic plants, now form part of a vast global horticultural industry.

The plant selection process, often directly from the wild, which has been followed in the past, has evolved fast over the last few decades into a high technology science. The era of complex genetic engineering with transgenic crops and ornamentals has arrived. Inventories of garden plants are needed as they help keep track of rapid change by recording what was extant at a particular time (Glen, 2002:iii).

2.4 The value of ornamental plants

2.4.1 Introduction

Various benefits may be derived from ornamental plants – aesthetic, stress-reducing and health-related. The therapeutic, inspirational and stimulating influence of plants around us should never be underestimated. Lohr & Relf (1993:106) have shown that there is more to the human need to surround oneself with ornamental plants than meets the eye. In every motive of human behaviour, from the most basic physical to the most advanced psychological, ornamental plants can play a pivotal role. It is essential to determine and take these needs into account when starting the selection process and especially

the marketing of ornamental plants.

A summary of the recommendations of the 1992 US National Symposium on “People-Plant Relationships – Setting Research Priorities”, Lohr & Relf (1993:106), suggest that the beneficial impacts of plants on people are broadly of three types:

- Environmental.
- Therapeutic.
- Economic.

New areas of research in the field of “Horticulture-Human-Interaction” are listed by Lohr and Relf (1993:106-107) for future programmes. These include economics and farming systems, environmental issues, employees and education, aspects of health, psychological, social and physiological aspects, community development, profit increases, as well as arts and culture.

This “Horticulture-Human-Interaction” research provides a link between traditional horticulture and meeting the desires and needs of the public and government in terms of improving quality of life as well as environmental quality. It will elevate horticulture from an ‘amenity’ to a basic necessity for human and environmental health and protection.

Recent studies by Kariuki, Ondieki & Njoroge (2011:77) found that ‘lifestyle horticulture’ or environmental horticulture has already established itself as a feature of quality lifestyles in many parts of Sub-Saharan Africa. These authors state that although the lifestyle horticulture industry is well established in nearly all developed countries, it is considered a luxury by the poverty-stricken populations of developing countries. Nonetheless, many fast developing countries, including those in Sub-Saharan Africa, are becoming increasingly urbanised and industrialised. This means that horticulture will progressively assume a more significant role as a lifestyle feature among the

newly affluent in these expanding, densely populated urban conglomerations. As the economies of these countries continue to grow apace, more and more people will be elevated to middle class prosperity where they will expect and demand a better quality of life, also in Africa (Kariuki *et al.* 2011:78).

2.4.2 Functional value

This refers to the practical and physical benefits of ornamental plants in the landscape. Although the use of nursery plants is derived from a number of aesthetic ideas and styles drawn from a wide array of cultures, nursery plants often serve functional purposes as well. They enclose areas, provide privacy and security, form partitions, cover the ground, prevent erosion, and furnish shade.

In South Africa, gardens of people from all cultural groups, including those from indigenous cultures in urban and rural areas, make use of several indigenous and exotic plant species to provide some form of protection or another and as hedges, windbreaks and shade trees (Molebatsi, Siebert, Cilliers, Lubbe & Davoren, 2010:2952 and Coetzee, Van Averbeke, Wright & Haycock, 2007).

Trees are the most prominent feature of all such gardens performing a function, for example as windbreak or shade tree, in over 80% of rural and deep rural home gardens in South Africa (Molebatsi *et al.* 2010:2958).

Studies have shown that landscape plants can substantially modify the climate of a localised area and consequently reduce energy costs (Harris, 1992:118; Simpson & Ogorzaly, 2001:411; Marx, Hendrick & Brown, 2003:20).

2.4.2.1 Microclimate enhancement

According to Harris (1992:5), the most important influence of trees

on the microclimate is their control of solar radiation in both winter and summer. Plants mitigate heat as they transpire, and trees provide shade that reduces solar radiation and reflection. Plants can increase fog precipitation. A tree can reduce temperatures by up to 1,3°C in its shade when compared to treeless urban sites. Shade from trees can reduce room temperatures in poorly insulated houses by as much as 11°C in summer. According to Simpson & Ogorzaly (2001:411), lawns have been shown to be 5–8 °C cooler than bare soil and 14–17 °C cooler than asphalt on sunny days. Trees around buildings can reduce the demand for heating and cooling, thereby reducing the use of electricity. Proper use of shrubs or vines that provide shade in summer and lose their leaves in the cold winter months can save between 10% and 40% in heating and cooling costs (Simpson & Ogorzaly 2001:411).

2.4.2.2 Airflow control and windbreaks

Plants modify the strength and direction of wind by obstructing, guiding, deflecting and filtering airflow. Air movement influences both real and perceived temperatures. Windbreaks decrease wind speed and correspondingly decrease the influence of the wind on perceived temperatures. The height, density and shape of plants affect how much wind reduction is achieved. Windbreaks have been shown to affect wind speed for a distance of up to 30 times their height (Harris, 1992:12; Simpson & Ogorzaly, 2001:413).

2.4.2.3 Air Purification

According to Harris (1992:6), the concentrations of air pollutants in many urban areas are so great that plants are not able to grow at their best, much less reduce pollution to acceptable levels. He states that vegetation ameliorates air pollution most effectively

through its ability to reduce airborne particles.

In cities with high pollution levels from cars or industry, plants have to be chosen that can tolerate high levels of acid rain, carbon monoxide and smog (hydrocarbons plus nitrous oxide). Indoor air also represents a major proportion of many people's exposure to air pollution. The responses of indoor plants to pollutants may provide a simple method of monitoring gaseous pollutants, as well as providing pollution abatement (Wood & Burchett, 1995:119).

2.4.2.4 Erosion control

Bare soil can be seriously eroded if exposed to rain, flowing water and wind. According to Harris (1992:8), water runoff accounts for most topsoil erosion. Plants intercept rain and thereby reduce its impact on the soil. The roots of plants also hold soil and further reduce erosion (Simpson & Ogorzaly, 2001:414).

2.4.2.5 Screening

Plants can form a physical barrier. These fulfil many functions like serving as security hedges, providing privacy or screening unsightly views, dividing an area for different uses, and directing pedestrian movement. Plantings in public areas must also withstand the relatively high levels of physical abuse suffered when they are bumped, broken, carved on, or visited by dogs. Plants are used to screen out light, in the case of glare from streetlights entering a home. Highway plantings protect oncoming cars and nearby residents from car lights and can prevent drivers from being blinded by the sun's glare (Harris, 1992:8; Simpson & Ogorzaly, 2001:413-414).

2.4.3 Psychological value

According to Simpson & Ogorzaly (2001:403), the Persian word *pardes*, means “paradise” or “garden” which is the “abode of the blessed after his mortal life” reaffirms how powerfully humankind needs gardens, how much the concept of their desirability is embedded in the human subconscious mind. According to Simpson & Ogorzaly (2001:403), this need, and its realisation, is not confined to any single religion but arose independently in many cultures, separated by both time and distance. Humans’ act of gardening can be seen as a deeply seated desire and “Quest for Paradise” here on earth.

To create envisaged paradisiacal environs would, indeed, involve the application of a principle: this principle is not new, but its adoption is vital to the health of humankind. King (1985:11) suggests that it deserves a title – it might be called *the paradise principle* and can be defined as: “Nature and humans are one; whatever divides them invites failure.”

Many gardens of indigenous cultural groups in South Africa contain features of spiritual significance. Coetzee *et al.* (2007) found that such gardens often had structural elements related to rituals associated with ancestral worship and the use of charms to ward off evil.

2.4.3.1 Healing, stimulation and inspirational value

According to Harris (1992:11-12), a number of studies verify the psychological and health benefits of plants to humans. It was found that hospitalised psychiatric patients spent more time eating when flowering plants were placed on their dining tables. They also ate more food and talked more with other patients than when flowering plants were not present.

According to Harris (1992:11), post-operative hospital patients

heal faster when they look at plants through a window. This has the potential to shorten post-operative hospitalisation by 8.5% resulting in annual health cost savings. Hospitals increasingly include plants in their care and rehabilitation programmes to speed up patient well-being.

Business and industry have found that attractive buildings and landscapes result in above-average labour productivity, lower absenteeism, and easier recruitment of workers with rare skills. Equally important is the fact that good-looking factories and offices build good community relations (Harris, 1998:12).

2.4.3.2 Morals and ethics

In the Far East, particularly in Korea, ornamental plants were traditionally grown or used not only for environmental beautification, but also for self-improvement, filial piety, family fortune, longevity and morality (Sim & Kwack, 1995:261). Although certain plants with symbolic value were generally planted in the garden, they were also painted to decorate indoor or outdoor walls, on furniture, and used as themes for poetry, essays or works of art. Trees, for instance, have always been symbols of fertility, longevity and wisdom. Accordingly, the living environment was filled with symbolic ornamental plants, and they influenced people directly or indirectly.

Sim & Kwack (1995:263) tried to find a way of teaching morality to younger generations by using ornamental plants. In landscaping, the traditional symbolic use of plants is being re-introduced in Korea to promote mental health and wellbeing.

2.4.3.3 Symbolic value

Chetwynd (1982:420) explains symbols from the plant world as follows: “Vegetation” or “Plant Life” is the original universal symbol of “The base of life itself” or the “Vegetable Soul”. It represents the earliest phases in the evolution of life, and therefore constitutes the deepest layers of human’s own unconscious life. A tree is the symbol of “Life without consciousness: The unconscious life of humans, his/her vegetable soul.” For humans it is a symbol of the bare processes of life, growing and dying – processes that continue at a deep level.

Living for several hundred years, older trees span ten or more generations of humans, so they become a symbol of the family tree branching outwards, generation after generation. Chetwynd (1982:405) clarifies that the branches represent the rich variety of life with its abundance of provisions. The sap of a tree represents the sap of life. The fruit may be the source of the Water of Life (*Au de Vie*), and also Ambrosia (i.e. the life-giving essence) (Chetwynd, 1982:406).

According to Chetwynd (1982:245-246) the lotus (also called the water lily) symbolises the light of conscious life. The lotus is the primeval plant, growing from the waters, not the land, as the serpent is the primeval animal. The importance symbolically attached to this eastern species of water plant derives from its resemblance to the moon. It is the original Flower of Light (*Fleur-de-Lis*), which in the West became associated with the lily.

Colour is also filled with symbolism (Chetwynd, 1982:91). The great range and variety of colours, which can be arranged in order of intensity, are especially suited to expressing the range and

intensity of feelings, values, and the quality of life as a whole.

2.4.3.4 Intellectual needs

Intellectual needs of humans are often satisfied by collecting or studying objects of curiosity. Objects of curiosity are those that are strange and fascinating, stimulating the human intellect and mind towards inquisitiveness, eagerness and the desire to know more. Plants with unusual habits, shapes and colours can fulfil this human need. They can be plants such as air plants (epiphytes like bromeliads, hanging onto trees with no soil to supply water and nutrients), succulents and carnivorous plants (Simons & Ruthven, 1995:20).

To collect involve the accumulation of certain things, in this case plants, as a hobby or for study. Plants become collectibles for various reasons, e.g. as status symbols, for their rarity value, or because they are unusual or difficult to grow. These can be plants such as cycads, palms, ferns, tropical orchids, succulents and bulbs. Collecting could also fulfil esteem needs in certain cases, where some plants such as cycads have become status symbols. A lush garden in itself has become a symbol of wealth and status (King, 1985:1; Burchett, 1995:81).

It is also true, though sad, that the dark side of humans, i.e. greed and pride, is often the motive to acquire certain plants. This is especially true for certain collector plants, or very expensive and rare plants. This in turn stimulates illegal trade and removal of rare plants from natural habitats.

2.4.4 Aesthetic value

Aesthetics involve anything visual, olfactory or tactile that is beautiful or pleasant to the human senses. Plant architecture, foliage, flowers, fruit, cones, seed, bark, scent, aroma or a pleasant touch can all be of value.

In contrast to plants that yield utilitarian products, ornamental plants are appreciated for their aesthetic qualities or are used to beautify the appearance of other objects. In many cases practicality and utility are also important factors in the choice of ornamental plants.

According to Simpson & Ogorzaly (2001:399), the criteria for what is beautiful is culturally determined in large part, and differs among countries, between parts of a country, among individuals, and from generation to generation.

Sub-Saharan African cultures do recognise the aesthetic appeal of ornamental plants (Kariuki *et al.* 2011:79). Indeed, ornamental plants, as a use category, form an important part of home gardens of indigenous cultures, and are especially in evidence in the urban and peri-urban areas of South Africa (Coetzee *et al.* 2007 and Molebatsi *et al.* 2010:2962).

Simpson & Ogorzaly (2001:399) state that there are a few basic elements of beauty common to art forms in general that can be applied to ornamental plants. The primary elements of beauty in plants are colour, texture, line and form.

- **Colour** is one of the primary elements of beauty. People perceive colour as a combination of features, including the hue, or spectral wavelength, which is reflected by an object and received by the eyes as a combination of blue, yellow or red, the lightness or darkness of a

colour, and the amount of colour saturation. All these factors subtly influence the choice of ornamental plants (Simpson & Ogorzaly, 2001:399).

- **Texture** is a component of beauty that is often subconsciously perceived. From birth people learn to associate certain visual patterns with tactile sensations and develop visual impressions of textures that allow them to “feel” through their eyes (Simpson & Ogorzaly, 2001:399). A similar process is involved when people see shaggy or smooth-barked trees or leaves with waxy or fuzzy surfaces.
- **Line** is another aspect of beauty that is not often consciously appreciated except by designers (Simpson & Ogorzaly, 2001:400). Yet size or outline frequently determines choice. Vertical branching patterns of trees or shrubs guide the eye upward, whereas horizontal branches lead it toward the ground. People trim hedges to produce precise lines that guide the eye or frame specific areas.
- **Form** is the last component of beauty of plants chosen for ornamental purposes (Simpson & Ogorzaly, 2001:400). It is a three-dimensional quality that involves both shape and structure. Differences in form can help determine how a plant is used as an ornamental. With age most trees and shrubs assume a form characteristic of their species. By knowing what the shape will be, or by pruning and training plants into desired shapes, a landscaper can use plants as architectural elements to create outdoor spaces.

According to Harris (1992:8-9) the visual benefits of landscape aesthetics containing trees and other plants are becoming more valued in our increasingly artificial world. Plants can keep us emotionally balanced and heighten the pleasure we derive from our surroundings.

Harris (1992: 9-10) lists the aesthetic advantages that plants can provide as follows:

- Plants provide a variety of colour, form, texture and pattern in the landscape.
- Plants soften architectural lines and accentuate structural details.
- Plants can form vistas, frame views, provide focal points and define spaces.
- Plants relieve the monotony of pavement and masonry.
- Plants, particularly trees, make enticing play areas.
- Plants offer cooling shade, pleasant fragrances, intriguing sounds and serene settings.
- Plants create the impression of a well-established place in new residential areas and minimise the raw unfinished look.
- Plants unify, giving coherence to visually chaotic scenes.
- Plants can emphasise the seasons.

In the past, not much was known about the aesthetic and psychological effect of individual outdoor ornamental plants. Studies done by Kravanja (1995:191) in Slovenia, using experimental aesthetics, tried to determine where the appeal in outdoor ornamentals lies. Basic research data have been obtained by using questionnaires and colour photographs of various outdoor ornamental plants to be evaluated according to preference. In the study, the heterogeneity of the group of persons questioned, and differences in their profession and level of education cause a high coefficient of variation with regard to some plant species, but with reasonable agreement on the most appealing plants (Kravanja, 1995:194).

According to Kravanja (1995:196), experienced psychologists are also of the opinion that ornamental plants are not really appropriate subjects for the investigation of aesthetic preferences. The variability of taste and preference of individuals is very high. The data presented showed aesthetic preferences

of people in Slovenia and should not be uncritically generalised for other social environments. The judgement or taste of a certain society depends on various factors, and on social and economic circumstances above all. The appeal of plants is influenced by the fashion of the moment as well. The preference of people for certain plants is furthermore influenced by the characteristics of, and indirectly by, climatic conditions of the country where the research is done (Kravanja 1995:197).

2.4.5 Economic value

Plant life is essential for the survival of all animals, including humans, and provides food, shelter and other life-supporting commodities. Plants also protect and maintain the environment against erosion and atmospheric imbalance. According to Wickens (1990:119) humans have always been dependent upon plants for the necessities for survival, not only in the three big Fs, Food, Fodder and Fuel, but also for medicines, fibres, chemical products, and other commodities such as ornamental plants.

According to Wickens (1990:119), economically important plants are defined as those plants utilised either directly or indirectly for the benefit of humankind. Indirect uses include the needs of livestock and the maintenance of the environment. The benefits may be domestic, commercial, environmental or aesthetic.

The economic value of ornamental plants affects material resources and the welfare of people in a positive or negative way. Economic pests like invasive plants for instance, have a negative influence on the economy. On the other hand, over and above the value of the plant as a saleable item of merchandise produced in a nursery that supplies jobs to many people, the value added to property by amenity plants is an asset.

Placing a realistic value on the benefits of landscape plants is complicated. Wisely designed landscapes can reduce heating and cooling costs of buildings. Erosion control plantings conserve topsoil as well as storm water. Landscaping can also prevent or reduce maintenance costs and loss of property. Tree felling and pruning can stimulate the development of other small businesses such as compost making and sawmills for wood (Harris, 1992:10).

Trees on privately owned property in South Africa contribute to the value of the real estate, perhaps even increasing values by 5–20% (Marx, Hendrick & Brown, 2003:20). The presence of trees can increase the appraised value of undeveloped land by as much as 27% (Harris, 1992:10). Trees and other plants give character and a peaceful ambience to a site and the comfort of shade and shelter make them a priority when selecting a site.

On private, public or commercial properties, trees have a value of their own, apart from that of improving the value of real estate. When appraising the value of plants, especially trees, the costs involved in the growing, planting and maintaining of amenity plants, as well as the hidden costs, must be taken into account. Currently South Africa does not have a nationally accepted, scientifically sound method to determine the monetary value of a tree (Marx, *et al.* 2003:21).

2.5 Conclusions

2.5.1 Historical background

From the historical background to the use of ornamental plants by humankind it can be seen that although most edible crops were introduced into cultivation thousands of years ago, many of the commercial ornamental crops were not been cultivated until a few decades ago. The cultivation of plants for

ornamental purposes is therefore a relatively 'modern' activity of humans. The ornamental plant industry is also characterised by its great diversity as opposed to the few species of food crops that have mostly been greatly modified by humans.

Southern Africa, especially the Cape of Good Hope, was an important area from which new plants were introduced into Europe during the late 1700s. The use of indigenous plants for horticultural purposes in South Africa started in 1655 when hedges of indigenous trees and shrubs were planted around gardens.

Interest in indigenous plants as garden subjects gained momentum approximately 220 years later during the 1970s. This coincided with the renewed interest in ornamental plants in Europe and also coincided with the decline in size of gardens since the 1970s. The strong interest in indigenous plants and furthermore for a specific lifestyle, is thus, worldwide, and in South Africa, a relatively modern trend of the past 40 years. This is a short time span in comparison to the past periods of development of cultivated plants.

It is also important to realise that the process of replacing existing cultivated plants with new plants, as well as the fact that the domestication of wild plants needs considerable periods of time. The plant selection process, often directly from the wild, which has started with edible crops about 10 000 years ago, has evolved over the last 500 years into a highly scientific process.

2.5.2 The value of ornamental plants

The value of ornamental plants to humans can be explained from the motives of human behaviour such as acquiring ornamental plants. It is clear that ornamental plants can satisfy human needs from the most basic physical to the most advanced, distinctly human psychological needs.

The environment can be physically improved by the practical and functional uses of ornamental plants and plants furthermore have a therapeutic influence on humans. The economic importance lie both in the monetary value of the plant as a saleable item of merchandise, the creation of employment and the value added to property by ornamental plants.

The aesthetic advantages that plants can provide reach beyond mere beauty. Ornamental plants can demarcate spaces, offer tranquil settings, minimise unrefined looks, and unify visually disorganised scenes.

Against this background of historical time frame and the human needs and values, the horticultural use of indigenous plants in South Africa is analysed. The relevant factors influencing the selection criteria for ornamental plants will be determined in Chapter 3, particularly in terms of the ability of indigenous plants to meet selection criteria, the sources of new ornamental plants and possible underlying factors limiting the horticultural use of indigenous plants.

CHAPTER 3

FACTORS INFLUENCING THE SELECTION OF NEW ORNAMENTAL PLANTS

3.1 Introduction

In this chapter the review of related literature is focused on the horticultural industry in South Africa and selected other countries with the view to identify and extract relevant factors and pertinent issues influencing ornamental plant selection to address the problem and its stated hypothesis. The issues are analysed to identify possible factors that may influence the horticultural use of indigenous plants as applied to the South African scenario.

3.2 Environmental issues

3.2.1 Introduction

On a global scale, nature conservation laws, international concern for the decrease in biodiversity, consumers' care for their personal health and the attitude of reputable plant breeders and producers are all contributions to the trend towards "caring for the environment". This interest in the environment, combined with an increased consciousness about health and nutrition, has helped to make horticulture one of the fastest growing industry segments in the USA (Relf, 1995:91). In the course of her professional career the researcher has also been struck by the growth of the horticultural market in South Africa.

According to Relf (1995:91-92), environmentally conscious directives applicable to horticulture include:

- Seeking to prevent pollution by reducing pesticide and fertiliser use; using integrated pest management techniques; recycling green waste and minimise run-off.
- Implement water-efficient practices, such as the use of mulches, efficient irrigation systems, audits to determine exact landscape water-usage and needs, using of recycled or reclaimed water and the selection and siting of plants in a manner that conserves water and controls soil erosion.
- To enhance landscape options and awareness, governmental and other research institutions should conduct research on the suitability, propagation and use of indigenous plants for landscaping.

The policy statement “People have rights to a healthy and productive life in harmony with nature” in the Convention on Biological Diversity (CBD) demonstrates the concern of governments as well as the public over the quality of the environment and is inclining towards actions to protect the environment, preventing further degradation and to remedy damage already done (Article 3, UNEP/CBD/94/1:6). This concern should be recognised and explored by horticulturists (Relf, 1995:91).

3.2.2 Urban greening and environmental horticulture

Programmes such as “Greening the Urban Ecosystem” have been developed, and are giving impetus to a new approach in horticulture (Dotter, 1995:210). Environmental horticulture is another similar concept, and is broadly defined as the industry that maintains and improves the functional uses of plants in populated areas, and thereby enhances ornamental production (Burchett, 1995:82).

Horticulture has an essential part to play in the maintenance and restoration of the urbanised environment and there are a number of different scales of operation – global, regional, and the individual city (Burchett, 1995:85). To ensure a sustainable biosphere, (planet earth and its life) Burchett (1995:87) proposes that decision makers in both industry and government should be lobbied for the introduction of horticultural measures for the improvement of biodiversity, environmental quality and human health.

According to Burchett (1995:79), the psychological and social environment of urbanised communities with overcrowding demonstrates:

- Alienation
- Increase in crime rates
- Growing confinement to the indoors at work and at home
- Loss of contact with nature
- Loss of natural vistas and landscapes.

The garden can serve as a model for the manner in which we should be caring for the planet. Sustainable residential landscape management programmes can be used to educate citizens regarding world environmental issues in a setting that is local, and more importantly, relevant to them (Burchett, 1995:77).

Aspects that need teaching in environmental horticulture, as identified by Dotter (1995:213-215), include:

- Ecological garden maintenance.
- Organic gardening.
- Small space gardens.
- Landscape renovation to increase property value.
- Garden maintenance simplified.

- The successful small landscape maintenance business.
- Philosophical horticulture.
- Landscape renovation.
- Compost and mulches.
- Minimum maintenance landscapes.
- Gardening as an effective community development tool.

Dotter (1995:209) comments that contents of such courses are relevant and informative, and that student participation in practical sessions are of central importance.

Kariuki *et al.* (2011:80) propose several strategies to promote environmental lifestyle horticulture as a way of improving the quality of life in the countries of Sub-Saharan Africa:

- The introduction of gardening activities in primary and secondary schools to imbue in youngsters a lasting appreciation of the benefits of garden cultivation and to teach them the skills to accomplish it. It is believed that the young people will carry forward these values and skills acquired at an early age into their adult lives and thus embrace horticulture as part of their way of living.
- Activities designed to teach gardening skills and demonstrate the benefits of horticulture should best take place out of doors rather than indoors. Such training activities will presumably result in some form of incipient gardens being established, with possibly a range of plants being planted and tended over time, thus leaving tangible examples of the attractions of horticulture for all to see. “Teach-by-doing” is probably one of the most effective ways of promoting horticulture in Sub-Saharan Africa.

- The creation of specially-designed ‘therapeutic’ landscaped areas for use by particular sections of the population, such as the aged, the youth, etc., and to provide attractive spaces for spiritual contemplation, cultural events, as tourist attractions, etc. Such accomplishments in landscaping would then also serve as an effective advertisement to the population-at-large of what civic and lifestyle enrichment may be achieved by good gardening design and applied horticultural excellence.
- The introduction of allotment gardening as a means of promoting food security; land near shantytowns should be made available for this purpose; further land for allotments should be set aside on unoccupied spaces and in riparian zones in or close to urban areas.
- The involvement of local communities in establishing landscaped areas designed to suit local conditions so as to improve their long-term sustainability, while at the same time providing training to the local inhabitants in gardening and how the produce may be used as sources of self-employment and extra income.
- The creation of partnerships, involving professional bodies, trade associations and other interest groups, to popularise lifestyle horticulture and to run awareness campaigns to promote its benefits among the local populations.

Kariuki *et al.* (2011:80) conclude by observing that the degree of well-being experienced by the citizens of any country depends on the degree of the quality of life that is available to them or to which they may aspire. The authors argue that if this relationship is properly understood by the governments of developing countries and their citizens, including those in Africa, it would lead to, among other things, vibrant and much valued

lifestyle horticultural industries in these nations.

Ultimately, horticulturists have a unique role to play in making a significant contribution to an ecologically sustainable biosphere in the long term, especially in an urban environment (Burchett, 1995:87).

3.2.3 New plants from the wild

According to Brickell (2001:160) horticulture relied heavily upon introductions of wild plants in the past for use as garden plants. Whilst understandable in the past, when there was little comprehension of the effects of widespread collection of living plants from natural populations, such actions are now indefensible.

In the Convention on Biological Diversity (CBD), declared in 1992 in Rio de Janeiro at the United Nations Convention on Environment and Development (UNCED) a new international law was developed that gives countries sovereign rights over their own genetic resources for the first time. According to Brickell (2001:162) the application of this legislation may have significant impacts on plant breeding and the use of genetic resources. The introduction of new plants may involve the completion of substantial procedural documents to obtain propagating material from biodiversity-rich countries, particularly developing countries which may wish to benefit from the commercialisation of their plant resources (Brickell, 2001:162).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) contains international legislation that protects plants. In South Africa, Parliament promulgated regulations in the National Environmental Management Biodiversity Act (Act no. 10 of 2004) concerning endangered and protected species.

Brickell (2001:160) states that it is essential that the germplasm of any new (as well as old) introductions of ornamental plants is conserved and that horticultural scientists should be sensitive to the environmental issues raised by collecting seed or plants from the wild. There is an urgent need to ensure that the loss of plant species in the wild should be halted. Species should be conserved both in their natural habitat and in cultivation.

3.2.4 Invasive plants

Just as South African plants have made their way into gardens around the world, so plants from other countries were imported for cultivation in South Africa. Most of these non-indigenous or exotic plants either succumbed to local conditions or survived but did not spread out of control. These are recognised as non-invasive exotic plants, and include most of the garden subjects and agricultural output in South Africa (Croudace, 2002:46).

However, some of these exotic plants have become serious pests and invaders. In South Africa landowners are legally responsible for the control of invasive alien plants on their properties in terms of the regulations of the Conservation of Agricultural Resources Act (Act No. 43 of Republic of South Africa of 1983).

Studies have shown that alien plant species, both invasive and benign, are rapidly spreading throughout South Africa, especially in the gardens of lower income households in urban, peri-urban and rural areas (McConnachie, Shakleton & McGregor, 2007:1; Lubbe *et al.* 2010:2903; and Molebatsi *et al.* 2010:2961).

Extensive land clearing for housing and infrastructure development occasioned by growing urbanisation often has a devastating impact on the natural areas in and around cities. Areas so cleared, when left

undeveloped, are frequently subjected to severe environmental degradation through the eradication of indigenous vegetation, the destruction of ecosystems, soil erosion, alien plant invasion and use as rubbish dump sites (McConnachie *et al.* 2007:1).

McConnachie *et al.* (2007:2) state that the worrying scale of alien plant invasions prevalent throughout the country is adversely affecting the long-term viability of native green spaces in our cities and towns; they contend that the larger the proportion of invasive plants over indigenous species in such areas, the greater the costs will ultimately be to restore them to their former pristine condition and to maintain them. Alien plant invasion is a major concern to environmentalists; the sheer size of the problem underscores the need that all South Africans should be able to identify invasive alien plants and take steps to eradicate or contain them.

An abbreviated interpretation of the categories of declared weeds and invaders, as contained in the Conservation of Agricultural Resources Act (Act No. 43 of Republic of South Africa of 1983), is given by Henderson (2001:9):

Category 1 – Declared weeds:

- Prohibited on any land or water surface in South Africa.
- Must be controlled or eradicated where possible (except in biological control reserves).

Category 2 – Declared invader (plants with value):

- Allowed only in demarcated areas under controlled conditions. Import of propagation material and trading allowed only by permit holders.
- Must be controlled outside demarcated areas, or eradicated where

possible (except in biological control reserves).

- Prohibited within 30m of the 1:50 year flood line of watercourses or wetlands unless authorisation obtained.

Category 3 – Declared invader (mostly ornamental plants):

- Existing plants may remain but must be prevented from spreading.
- No further plantings allowed (except with special permission).
- No trade in propagation material.
- Prohibited within 30m of the 1:50 year flood line of watercourses or wetlands, or as directed by the executive officer.

This legislation and awareness of invasive plants stimulate and encourage the use of indigenous plants for horticultural purposes.

3.3 Commercial competition in the horticultural use of South African indigenous plants

3.3.1 Exotic plants

South Africa has a rich floristic diversity of approximately 20 000 species (Mucina & Rutherford, 2006:14) concentrated in a relatively small geographical area. Species-rich floras are also found in several other areas of the world. More than 20 000 species each are found in China, Mexico, New Guinea, continental USA and Venezuela, and more than 50 000 species in Brazil and Colombia (Van Wyk & Smith, 2001:5). These other regions are of considerable competition to South African flora in the commercial environment.

Harris, Cadic and Decourtye (2000:191), state that the interesting and unique flora of New Zealand, and especially its climate, make this country a

good choice when scouting for new plants for introduction into markets of the northern hemisphere. The lower latitudes, maritime climate and periodic episodes of freezing winter temperatures increase the possibility of introducing New Zealand plant material that are more likely to be resistant to cold damage such as *Cordyline australis* on the South African Highveld.

According to Slater, Jones, Horlock, Henderson, Faragher & Beardsell (1998:100), Australia is another country well known for its unique and diverse flora, with estimates of between 18 000 and 30 000 species of flowering plants. The main centres of diversity are recognised as the rainforest of north-eastern Queensland and the heath and woodlands of south-western Australia. The heathlands, woodlands and rainforests of south-eastern Australia contain a wide variety of plants, including the well-known Thryptomene and Waratah, which can be used as cut flowers (Slater *et al.* 1998:103).

With water becoming one of the scarcest resources on the globe, horticulture too, is at the brink of a new era. Over much of Australia plants must cope with and have adapted to dry conditions and is thus able to supply drought tolerant plants for horticultural use (Blackwell, 1998:263).

In Australia, as well as South Africa, the ways used to develop new floricultural crops seem identical, starting with wild picking, then cultivation of the most promising species, and, as a final step, the selection of better-suited varieties by improving quality, homogeneity and other traits. This process is well demonstrated by breeding programmes of *Protea* species in South Africa and *Anigozanthos* species in Australia (Cadic & Widehem, 2001:77).

Countries with aggressively growing economies that are actively searching for new products pose a threat to South Africa, both as a producer of

horticultural products as well as a source for new products. Countries formerly closed for political or geographical reasons, such as China and other Asian countries, have opened up to the rest of the world and many exciting plants as well as new production zones for ornamental plants originate in these areas.

New introductions furthermore appear from countries such as Israel and Chile. Recently the Israeli native species *Allium aschersonianum*, which is indigenous to the Jordan Valley and the Negev desert, has shown promise for use as cut flowers and potted plants. Research and development of *Allium aschersonianum* as ornamental crop was started in 1996 in Israel (Gilad, Hovav, Sandler-Ziv & Kamenetsky, 2001:171). Its close proximity to the European market, its warm climate and the already substantial horticultural industry create a national attitude of support and interest towards such research.

According to Kim & Ohkawa (2001:179), Chile is also known internationally for its many plant species that have good market potential and two new geophytes, *Leucocoryne coquimbens* and *Zephyra elegans*, were recently introduced as new ornamentals to the Northern Hemisphere markets. Because of the constant need for new crops to stimulate economic growth and establish fashion trends, prospectors often start with extensive literature surveys on genera they are interested in (Kim & Ohkawa, 2001:179).

3.3.2 Popular horticultural plants poorly represented in South African flora

Certain popular horticultural plant groups are poorly represented in the South African flora. Palms and tropical rainforest understory plants such as Aroids are some of the world's most wanted ornamental plant types, both for outdoor landscaping as well as indoor pot plants. The past decade has seen many expeditions into remote areas by palm enthusiasts searching for

new species. (Ellison & Ellison, 2001:1).

South Africa has only a few palm species, one of which is very rare; *Jubaeopsis caffra*, the Pondoland palm. The only really successful southern African palm for horticulture is *Phoenix reclinata*, the Senegal date palm. It is an attractive clustering or multi-stemmed palm. The Lala palm, *Hyphaene coriaceae (natalensis)*, is used to a lesser extent in horticulture.

Madagascar, on the other hand, is known for its rich and very varied flora, with an unusually large number of handsome palms. In recent years, several native Madagascar palms have reached prominence in the horticultural trade. Besides these, there is an active trade in miscellaneous unusual and rare palms, mostly for the enthusiast market (Dransfield, 1999:21).

The South African flora is also poor in coniferous plants and members of the Rosaceae family and cannot supply ornamental plants in these popular horticultural groups. Of additional significance in these groups is their tolerance to low temperatures.

3.4 The domestication of wild plants

The introduction of new species into well-known horticultural taxa is more common (e.g. species in the Asteraceae or Daisy family) than in taxa unknown in ornamental horticulture (e.g. species in the Asclepiadaceae or Milkweed family). However, the introduction of new cultivars in known ornamental plant groups (e.g. new cultivars in the Geraniaceae or Pelargonium family) is commonplace. Nevertheless, regardless of the origin of a new ornamental plant, the development and introduction of commercially successful and profitable taxa is challenging (Wilkins & Erwin 1998:81).

Wilkins & Erwin (1998:81-82), state that production development involves the domestication of wild plants and entails the collection, identification, selection and breeding of a crop under various environmental conditions. Production development involves basic and applied research related to flowering physiology and cultural requirements necessary for growth (nutrition, light, temperature, water, and pest and disease issues).

According to Johnston & Webber (1998:106), domestication may be unsuccessful for many species. The process of domestication is seen as a three-step process of initial biological and ecological studies, an investigation of propagation methods and a selection process for the horticultural use of species either prior to propagation or, if necessary, after propagation has been resolved.

The process as described by Johnston and Webber (1998:106) involves:

1. A study of the plant in its natural environment and in published literature. This study should include taxonomy, distribution, climate and soils, floristic associations, morphology, growth and development, seasonality and response to harvesting.
2. An investigation into propagation methods. This can often be the most difficult part of the domestication process and can require a lot of time and resources.
3. A process of selecting elite types. This process may occur at any time during domestication and may be an ongoing process of repeated selection and propagation. Plants are selected for their attractiveness, ease of propagation and suitability for their intended use. This may be a slow and labour intensive process requiring a great deal of propagation and growing space.

Overcoming the challenges of nursery management and growing the selected cultivars to maturity so they may be assessed for their horticultural value is time consuming and labour intensive.

It is critical to the commercial success of a product to develop criteria for the consistent and reliable propagation, transportation and introduction of new plants to the market. Patent protection, or plant breeder's rights protection, is crucial as it generates revenue to fund the project development process and the commercialisation of taxa in the future (Wilkins & Erwin, 1998:81).

According to Wilkins & Erwin (1998:81), market promotion is the responsibility of the producer, trade associations and the retailer. Part of the market promotion process involves releasing and commercially evaluating an introduction in greenhouses and trial gardens in different geographic regions. This is done to ensure that successful cultivation is possible in desired locations and to expose the producer, retailer and consumer to the product.

3.5 Sources of new ornamental plants

3.5.1 Introduction

It is argued by Brits, Selchau & Van Deuren (2001:165) that relatively few species with exploitable commercial potential remain in the wild. They state that it should be taken into account that no natural resource is boundless, and even a rich diversity has its limitations. According to them, the effect is particularly severe for the private grower who is limited by:

- Distance from the markets.
- The absence of a culture of market orientated breeding improvement.
- A lack of access to legal and technical resources.

- A lack of the necessary market experience to successfully introduce new cultivars to the local as well as overseas markets.

The notion that South Africa could substantially increase its national prosperity through breeding inputs into indigenous floriculture could therefore be little more than a myth (Brits *et al.* 2001:165).

3.5.2 Botanical gardens, collectors and specialist nurseries

Botanical gardens and specialised plant collections are rich sources for plant material, some of which can be used for introduction as potential ornamental crops (Halevy, 1999:408). Individuals, societies and small specialist nurseries often grow rare plants that are not commercially or widely available to the public. In South Africa this is especially the case for indigenous plants in certain areas where local growers are interested in the indigenous plants of that area. This can apply to plants in a certain category, such as herbs or succulents.

Botanical gardens and seed banks house up to a third of the world's vascular plant species. With plants species from around the world collected in one place, these gardens may seem to be rich sources of many kinds of plants. Botanical gardens and seed banks are in the process of establishing guidelines for genetic resource utilisation (Dove, 1998:1273).

Plant utilisation is a core activity of the South African National Botanic Gardens (NBGs). The NBGs were given a mandate in terms of the Forestry Act of 1984 “to promote the conservation of, and research in connection with, southern African flora” and furthermore to investigate the economic potential of indigenous plants and promote their utilisation (Eloff, 1987:123).

The Kirstenbosch Botanical Garden has increasingly become associated

with horticultural knowledge and expertise. Although plants were cultivated for economic purposes when Kirstenbosch Botanical Garden was established in 1913, and there were already 222 economically important species in the garden by 1933, the effort was later abandoned as a result of other requirements that had higher priority. However, the distribution of seed of indigenous species and cut flowers, both locally and overseas, has continued to increase.

The identification of indigenous plants with economic, horticultural or medicinal value resumed as a core activity of NBGs during the late 1980s. Although hybridising has never been a priority of the NBG, the selection of superior forms is a continuous activity, with many excellent forms of indigenous plants being grown at Kirstenbosch and other botanical gardens. With its' world-renowned floral diversity, South Africa is regularly visited by horticulturists to source and collect plants (Eloff, 1987:125).

Although some of South African plants are easy to propagate and hybridise, the majority of the approximately 20 000 species of indigenous plants are however, not easy to grow. Ongoing programmes of horticultural research and trials will be necessary to ensure a steady flow of exciting new introductions to the horticultural industry in South Africa and abroad (Powrie, 1998:2).

The efforts of horticulturists at South Africa's nine National Botanical Gardens are rapidly expanding and the knowledge base and cultivation guidelines on more than 2 200 species (approximately 10% of the South African flora) are available. This still means that relatively few members of this vast flora are currently being cultivated. Powrie (1998:4), comments that many of the new plants she listed in "Grow South African Plants" are fairly new to cultivation and have not been extensively tried in a wide range of climatic conditions.

According to Eloff (1987:125), the following questions should be asked in order to utilise plants successfully:

- What is needed?
- What is available?
- Can it be grown?
- How valuable is the plant?
- How does one market the plant to maximise benefits?

A great advantage of the NBGs is that their horticulturists and supporters often venture into the field. Plants with exceptional qualities can then be spotted and seed, cuttings or the plants themselves collected for testing.

Surplus plants at Kirstenbosch are made available directly to the public by means of plant sales. At other NBGs, plant sales are held on a yearly, monthly and daily basis as well. It was anticipated by Eloff (1987:128) that in the future, plants with horticultural, medicinal and economic potential will be evaluated, selected, developed and, when feasible, grown and marketed by botanical gardens in South Africa; Kirstenbosch in particular. A seed bank has been established and operates to conserve genetic diversity and additionally to distribute seed for cultivation in other gardens and nurseries. Plants and flowers that are otherwise unavailable in commercial nurseries are made available to the visiting public (Eloff, 1987:128).

3.5.3 Fashion revivals and re-introductions

Fashion is an important phenomenon in all areas of human life. As with everything else, we see fashion revivals in the use of ornamental plants as well. Aloe species from the veld, as well as many new hybrids developed in gardens, especially by collectors and hobbyists, were popular during the 1960s and 1970s. This fashion came to an end during the 1970s and

1980s, but a huge revival of interest in aloes can be seen from the 1990s onwards. They are either used as a fashion statement, complementing modern architecture or landscaping, or as collectables for pot plants. The stark beauty of their often strange and inspiring architecture makes them suitable accent plants in a variety of settings. *Aloe barberae* has become widely available again as an accent plant and is well used as such. Other species and hybrids are increasingly finding their way into general gardening.

Aloe hybrids are commonly encountered and most aloes will interbreed freely. Hybrids are often more beautiful than their parents. They often grow more rapidly, flower sooner and produce more striking flowers than either of the parents. This phenomenon is known as 'hybrid vigour' and makes some of the hybrids highly sought-after for cultivation (Van Wyk & Smith, 1996:22). The revival of interest in aloes combined with their ease of hybridisation makes them ideal plants for commercial breeding programmes.

During the Victorian era, *Sansevieria trifasciata* was a favourite pot plant, because it could withstand the toxic fumes emitted by coal fires and gas lamps (Simons & Ruthven, 1995:13). With the new introductions from all over the world, these plants went out of favour and were replaced with new plants.

Lately, a worldwide revival of interest in *Sansevieria* species can be seen. The beautiful architectural lines of the leaves fit in perfectly with and complement modern architecture and interior design. With the increase in high-density living, the indoor pot plant market is destined to grow steadily well into the future.

Other plant uses of economic importance are the fibre and medicinal

applications in traditional practices in Africa. Overexploitation of plant resources by local communities in Zimbabwe has led to local extinction of certain *Sansevieria* species (Takawira & Nordal, 2002:189). Horticulture can be an avenue through which wild species can be ensured of their sustained survival. Variations in a genus additionally pose a challenge to ornamental plant breeders to exploit the wide range of *Sansevieria* species that grow in the wild.

3.5.4 Heritage plants and ancient cultivars

According to Brickell (2001:161), it has only recently been realised how important historic gardens and old civilisations are as genetic resources. A new movement for the conservation of botanic gardens, old and historic gardens, and even private, corporate and institutional gardens and plant collections of note has started. Apart from the important cultural, spiritual, recreational, aesthetic and functional heritage these gardens represent, they have provided safe custody for many plant species over the world. According to Brickell (2001:161) several old cultivars and many species would have died out were it not for these gardens.

Globally, a clear need exists for *ex situ* conservation of ornamental plants in national and international collections. Considerable attention has been paid to the conservation of cultivated food plants and other crops of economic importance. The emphasis has been on conserving primitive cultivars, which represent the centre of genetic diversity, with a high potential for useful breeding. Regrettably, at present, no organisations exist that provide equivalent conservation policies in relation to ornamental plants (Brickell, 2001:161).

Garden plants that had not been ennobled in recent times (after 1990) are

considered heritage plants (Fisher, 2005). These plants could be associated with one or more of the following:

- An old collection.
- An old garden.
- A person of note.
- A grower of note.
- A nursery of note.
- A habitat where the exact location is no longer known or has been destroyed.
- Confiscated material from illegal collecting, particularly where exact location of habitat cannot be identified.

Organisations such as clubs or institutions that take an interest in collecting a certain plant, for instance *Clivia*, should endeavour to create and register a category of heritage cultivars. The distinct features and characteristics, which may be desirable in breeding programmes, are to form part of the record.

One often comes across ornamental plant cultivars that are more than a hundred years old, and could therefore be regarded as “ancient cultivars”. Ornamental plants have played an important role in the cultural development and ceremonial and religious activities of many old civilisations.

A good example of the use of old gardens as a source of “new” material for ornamental plants is the historic gardens of Lake Maggiore, Italy. The introduction of *Camellia japonica* in Italy occurred around 1760, but the plant only became popular during the 19th century. Many Italian nurserymen started growing camellias at that time, and this became a very important business. In her study of these old cultivars Remotti (2002:179), aimed to rediscover forgotten ones, define guidelines for phenotypic

characterisation, and re-introduce them to commercial practice.

Research work in floriculture is undertaken to safeguard cultivar variability. The decrease of genetic variability of cultivated species is a problem at present. Another problem is that once lost, the genetic diversity gained through time with genetic improvement is impossible to reconstruct. The consumer, continuously demanding new plants over time, is the major reason for the disappearance of old cultivars and their genetic variability. At the same time the success of new introductions is dependent on the availability of genetic variability. Genetic erosion is obvious and assumes an alarming significance especially in those species in which genetic improvement has resulted in an extremely high number of cultivars (Remotti, 2002:179).

The mere survival of *Camellia japonica* cultivars selected over a century ago in historical gardens shows tenacity for extremely rigid selective factors. They represent a valid botanical heritage for the local climatic conditions, as well as disease resistance. Even if these cultivars may not all be suitable for the current ornamental plants market in their present state, they may be used for genetic improvement to supply other valuable characters (Remotti, 2002: 187)

According to Leszczynska-Borys (1995: 252), ornamental plants are well represented in rural gardens of ethnic communities in Mexico and are widely used during community festivities. Some cemeteries are distinguished by their abundance of flowering plants. Much knowledge on species is located in these communities, and could provide a source of material with unexplored potential that could be useful for new commodities in ornamental horticulture (Leszczynska-Borys, 1995: 259).

3.5.5 New applications for known plants

It is possible that old, familiar and well known garden plants can acquire a completely new application in ornamental horticulture. This is particularly true of certain trees that have become or have the potential to become very successful indoor container plants. Forest tree seedlings are obligate sciophytes (shade plants) in their young stage and, therefore, exceptionally well adapted for low light environments. A good example here is *Trichilia dregeana* (Forest mahogany) that has recently been introduced as an indoor foliage container plant (Middleton, 1998:77).

From some plants grown mainly as agricultural field crops, new ornamental cultivars have been introduced and used as cut flowers for example *Helianthus annuus* (sunflower), *Gossypium hirsutum* (cotton) and *Carthamus tinctorium* (safflower). There are moreover, garden and landscaping plants, mainly woody or herbaceous perennials, used for many years in gardens recently introduced with great success into the cut flower trade such as *Hypericum* species (Halevy, 1999:408).

3.5.6 Horticultural neglected species

A good example of this is the genus *Plectranthus*, growing naturally in the subtropical south-eastern parts of South Africa as forest floor plants. No or little breeding improvement has been done on this genus until very recently. Although the genus has been known by horticulturist for a long time, the first distinctive varieties of flowering pot plants were developed by a private breeder in South Africa very recently (Brits *et al.* 2001:166).

The breeding programme focused on developing a wide variety of compact plants with large and floriferous flower types and beautiful foliage. Improved foliage characters include texture, shape, colour and fragrance. Research

and development were done by a group of specialist nurseries in South Africa, Europe, Japan, the USA and Australia (Brits *et al.* 2001:167).

3.5.7 New cultivars

New cultivars are a major source of new ornamental plants in the commercial environment today (Brickell, 2001:160). Some genera, for example perennials such as *Pelargonium* and *Gerbera*, have been the subject of intensive breeding and selection as ornamentals over many years and there is a bewildering choice of “novelties” flooding the market from which to choose. As both bedding and pot plants, more than 35 million geranium plants (the popular name of *Pelargonium*) from about 250 cultivars are now sold every year in the United States alone (Anon, 2003:26).

In South Africa, the Agricultural Research Council (ARC) does much of the horticultural crop and technology development for certain indigenous crops such as vegetables, flowers and medicinal plants. Genebanks are established, cultivar development is done and training is provided for crop production.

Despite the economic importance of the floricultural industry world-wide, strategies for breeding new cultivars lag behind those developed for agricultural crops (Debener, 2001:121).

The available gene pool for novel target genes is virtually unlimited in the area of ornamental plants. Among the first genes transferred to ornamental plants other than marker genes, were genes for the modification of flower colour, genes for the modification of ethylene biosynthesis of phyto-hormones, and defence genes against fungal pathogens.

Target traits are mainly centred on disease resistance, stress tolerance, delayed senescence, post-harvest performance, novel colours and altered plant architecture. The efforts undertaken in these projects boosted technological developments such as microarrays, bio-informatic tools and transformation technologies, which will strongly influence ornamental plant breeding in the near future.

According to the growing number of publications on the application of molecular methods in ornamental plant genetics and breeding, a change in strategies has already taken place that opens up new perspectives for the creation, selection and use of genetic variability. Therefore, the speed with which strategies for ornamental plant breeding will change over the following decades is steadily increasing (Debener, 2001:124).

Mutations induced or occurring in nature, such as variegated plants or flowers of different colours, and stunted growth forms that are in fact unnatural but attractive to the human eye, have been quite a good source of new ornamental plants and can be registered as cultivars.

Variegated forms are good examples of mutations that have ornamental value. As generally accepted variegation refers to foliage which bears white or cream markings due to the absence of the essential green pigment chlorophyll. A virus which inhibits the formation of chlorophyll often causes the latter, but more regular types may be due to mutations (Bradley, 1993:328).

Some viruses have no weakening effect on plants even though they produce prominent white or yellow spots or blotches on dicotyledonous leaves and stripes on monocotyledonous leaves. Many of these plants are sought after as ornamental plants.

Well-known or lesser-known ornamental plants with unusual leaf colours and growth forms in nature can result in diversification and the extension of its use as an ornamental. These plants can even serve as a genetic source for hybridisation with other species.

A good example is *Cordyline australis* (New Zealand cabbage tree), which is widely grown in temperate climates as a garden and landscape subject and as a container plant. An increase of its use as an ornamental has been based on discoveries of plants with unusual leaf colours and growth forms (Harris, 2001:188).

“Freak” plants, often discovered when plants are propagated in nurseries, are likely to remain an important source of new ornamental cultivars. A single variegated plant, for instance propagated by cuttings, should provide a stable cultivar. However, this is a slow method of propagation and it can take up to 50 years to increase the stock to provide sufficient plants for commercial release (Harris, 2001:189). Tissue culture is moreover not an easy option for providing uniform variegated plants, because it shows varying degrees of reversion to normal leaf type.

Witches’ brooms (dense clusters of small, twiggy stems), arising as mutations, may be propagated by cuttings and remain compact-growing dwarf conifers. Many dwarf conifers are of this origin (Bradley, 1993:329).

A good example is the use of witches’ broom of the *Pinus halepensis* (Aleppo pine) as new ornamentals. Only the female flowers flower regularly in witches’ broom, while the normal parts of the same tree have both male and female flowers. These witches’ brooms are of a genetic and therefore hereditary nature, and not the result of parasitic activity. Candidates for new cultivars can be selected from the clusters generated by cluster analysis. Witches’ brooms are a suitable source for the cultivation of

progeny among which candidates for new cultivars can be selected (Vrgoc, 2002:203).

3.6 Natural attributes of plants

3.6.1 Undesirable natural characteristics

Several physical characteristics of plants, as well as survival and reproductive strategies and interactions with other plants or organisms, may render them unsuitable for use as ornamental plants or difficult to domesticate. These may include:

3.6.1.1 Specialised survival and reproduction strategies in nature that are harmful to human health.

Poisonous and toxic plants and those producing allergens can be harmful or uncomfortable to experience in a domestic environment and should be avoided. Thorns, irritating hair, and excessive exudates such as gum and latex are undesirable especially in plants that are handled directly such as cut flowers and foliage or in close proximity of living areas where movement is important such as an entertainment area or swimming pool.

Even normal and seemingly harmless parts of plants can disqualify them from use in a human-made environment. Pollen is such a substance and is the main culprit causing seasonal hay fever. According to Maneveldt (2002:100), small, light and dry windborne pollen causes the most allergic reactions associated with hay fever. This type of pollen is often produced by plain-looking wind-pollinated plants that do not have showy flowers, but produce pollen in large quantities.

Allergic reactions to pollen can be minimised by choosing the right plants for a garden. The first rule is to plant trees, shrubs, and groundcovers with large flowers that rely on animal or insect pollination and which have male parts recessed in the flower. These plants produce large, sticky pollen grains in relatively small quantities that are too heavy to be carried by the wind. The second is to use female dioecious plants (where male and female organs occur on separate plants) that produce no pollen (Maneveldt, 2002:100).

3.6.1.2 Adaptations and characteristics that appear strange to the consumer.

Although there are a great number of true ferns, only a few species are suitable for florist use. In many species brown fruiting bodies, the sori, develop on the margin or underside of each pinna. For florist use, fronds must be completely expanded, with the sori immature or not present at all (Salinger, 1987:248).

Coloured foliage may be a problem as well. Variegated foliage, green and yellow or green and gold foliage may be considered to be a symptom of disease on the parent plant or the leaves. This re-emphasises the need to examine the market and to assess buyers' attitudes before exporting anything unknown to the country concerned (Salinger, 1987:248).

3.6.1.3 The need for veld fires and burning to stimulate plant growth

According to Van Wyk & Malan (1998:13), an important feature of many attractive flowering plants of certain biomes in South Africa such as the Grassland biome, is their perennial underground storage organs. These include bulbs, tubers and rhizomes that enable plants to survive fire, spells of drought and low

temperatures. Fire is an extremely important factor in this biome and many of the non-grassy herbs cannot survive for long in its absence (Van Wyk & Malan, 1998:14). *Xerophyta retinervis* (Monkey's tail) for instance is a very attractive plant but to date has not been very successful in gardens.

3.6.1.4 Exceptionally large underground structures

Examples are *Erythrina zeyheri* (Ploegbreker) which is a very attractive deciduous shrublet with a large tuberous rootstock (Van Wyk & Malan, 1998:206). These large underground structures have evolved as a survival method in case of drought, fire or frost. Plants with this adaptation are suitable only for large gardens and parks with sufficient soil areas and soil depth.

3.6.1.5 The whole plant is unattractive or untidy

Consumers tend to regard compact growth or bushiness as a sign of health (Townsend-Brascamp & Marr, 1995:199). Many plants in the South African flora just do not fit this profile. An example of such a plant is *Ehretia rigida* (Puzzle-bush); a shrub, although used in indigenous gardens to attract wildlife, may have a limited market due to its untidy straggly appearance.

3.6.1.6 The plant needs a specialised habitat and will not grow elsewhere

The domestication of wild plants is an important prerequisite for plants used in ornamental horticulture. The majority of South African plants will not grow in cultivation (Powrie, 1998:2), or may only rarely flower when planted outside their natural habitat.

3.6.1.7 Monocarpic plants

Certain plants flower and bear fruit only once and then die. This

can be a disappointment to the owner when several years have been spent to the cultivation effort of such a plant. The Wild banana (*Ensete ventricosum*) flowers once after about 8 years and then dies after fruiting (Van Wyk & Van Wyk, 2009: 56).

3.6.1.8 An unpleasant or foetid smell

With certain reproduction strategies where flies and bottle flies are used as pollination agents, the flowers produce aromas similar to faeces, such as *Gymnosporia buxifolia* (Common spike-thorn) that produces strongly and unpleasantly smelling flowers (Van Wyk & Van Wyk, 2009: 122), or rotting meat, such as *Stapelia gigantea*, the carrion flower (Van Wyk & Malan, 1998:96). The unpleasant smell might furthermore be a survival strategy, where the whole plant such as *Walafrida gracilis* (Honde-kak-en-pisbos) has an unpleasant smell to protect the plant against herbivores (Shearing & Van Heerden, 1997:138).

3.6.1.9 Specialised symbiotic associations

Many associations in nature, such as parasitism in *Striga* sp. (Van Wyk & Malan, 1998:236), are crucial to the survival of an organism and cannot be imitated successfully in a domestic environment. *Burkea africana*, an attractive bushveld tree, is extremely difficult to grow (Van Wyk & Van Wyk, 2009: 502). This might be due to root-michorrhiza associations which are often unknown and may be detrimental to the survival of many species.

3.6.1.10 Specialised reproductive strategies

Where plants cannot be reproduced in a vegetative manner and depend on a specialised pollinator or other strategy for reproduction that cannot be imitated in cultivation, they are unsuitable for production.

Much basic information on the biology of many plants is not yet known, nor freely available. It is clear that basic research in biodiversity is of paramount importance in understanding and selecting plants suitable for utilisation purposes. When new plants are sourced in nature and no undesirable characteristics are noticeably present, only a limited number of those wild plants may be suitable to serve the specific purpose of being an ornamental plant and furthermore successful in the commercial environment.

3.6.2 Plant morphology

Morphological characteristics determine the visual appearance of a plant and thus are the first factors considered when choosing new ornamental plants. Aesthetic properties are the most important attributes of such plants. Beauty, colour and texture as well as architectural properties such as line and form have a strong visual impact on the human eye. What people regard as beautiful is subject to many influences and preferences such as culture, fashion and psychology.

Lush foliage and flowers are much appreciated in ornamental plants. However, according to Vabrit, (2002:67), plants with a modest growth habit may form a very decorative group if planted in great numbers. The researcher therefore recommends that to determine the suitability of a species for bedding purposes, plantings should be evaluated as a group, and not only single plants.

To adjust to market trends, new horticultural products are often developed from old and well-known ornamental plants. Many types of plants, for example those used as garden plants, have found new uses as hanging baskets or potted and container plants. For these purposes, the morphological characters are the ones that determine the suitability of a

plant for one use or another (Vabrit, 2002:67).

According to Vabrit (2002:67), the interest of plant producers, wholesalers and retailers is directed towards individual plants with an attractive appearance and good transportation durability. Landscape designers and gardeners on the other hand are interested in new bedding plants that can be grown in a group to create a mass display. It would be ideal if a new product corresponded to the expectations of both. Vabrit (2002:67) furthermore states that many new varieties of species such as *Nemesia* and *Lobelia*, recommended for bedding, are not suitable for this purpose because their characteristic of a very compact growth habit as young plants does not change when they grow bigger. Such plants are suitable as pot plants only. As bedding plants they are uneconomical, because the number of plants needed per unit area is relatively large and their coverage uneven (Vabrit, 2002:67).

At present, research concentrates on comparing the morphological properties of bedding plants from a landscape design viewpoint. Rather than looking at a single plant, a group of the same plant is studied to consider the morphological properties characterising the group as a whole (Vabrit, 2002:67).

It has been found that although a plant-filled environment decreases the stress levels of humans, a large number of intensely coloured patches may be tiring due to the psychological influence of colours on humans (Vabrit, 2002:70). From a landscape point of view, very intense and bright spots of colour may not always be appreciated. The visual effect of a plant group depends on the diameter of the individual inflorescences or florets and their quantity per area unit. The smaller the diameter of the flower and the smaller the number of flowers the weaker the effect of the colours.

Therefore, plant groups of species with fewer and smaller flowers are characterised by modest colouring (Vabrit, 2002:70) and may prove to be more desirable for certain situations.

3.6.3 Plant physiology

The features of plants are closely tied to environmental conditions and are more specifically determined by climate and soil factors. Nearly all life forms, including plants, have different ecological tolerances. The physiological integration of the total environment is needed for the successful existence of a plant, and there is often moreover a correlation between morphology and the adaptation of a plant to its environment (Rutherford & Westfall, 1994:6).

The physiological adaptations of the plant as determined by the climate in which it grows will determine in which climatic zone it can be used as an outdoor plant. For indoor use or greenhouse production, where there is a certain measure of climate control, the physiological adaptations may be less important.

The microclimatic requirements of plant communities can often be imitated, enabling plants to grow outside their normal geographic range. This allows plants with ornamental value to be grown in cultivation and to be available for this purpose far from their natural areas of distribution.

It can furthermore be important to select specific ecotypes to match specific horticultural needs. These already adapted ecotypes are more likely to succeed in cultivation. When considering new ornamental shade plants in South Africa for instance, one should try the shaded southern slopes of mountains and hills (Middleton, 1998:42).

Cold resistance is of major importance when selecting plants for outdoor use, especially for the temperate zones of the world. Important work by Harris *et al.* (2000:191) has been done on the acclimatisation and selection of New Zealand plants for ornamental use in Europe.

According to Blackwell (1998:263) advantage should be taken of the assets produced by xerophytic plants. With water becoming one of the scarcest commodities in many parts of the world, greater attention is focused on better selection of suitable species for sustainable urban horticulture and amenity planting in drought prone areas. It is in this context that Australian native plants have a contribution to make in addition to their unique floral and vegetative attributes. The great diversity of sclerophyllous plants provides a large palette of native Australian species to choose from for growing successfully in specific arid-zone environments (Blackwell, 1998:265). South Africa too has an abundance of drought-resistant plants, especially succulents (Van Wyk & Smith, 2001:5) that could be put to use in dry conditions.

Drought resistance depends primarily upon how efficiently plants use water, and secondarily upon how effective they are at obtaining water and preventing unnecessary transpiration. Plants living under extreme environmental conditions have survival mechanisms in the form of a number of interesting physiological and metabolic changes, anatomical modification, and special morphological adaptations. Special adaptations of these plants include phraetophytes, specialised ephemerals, resurrection plants, specialised metabolic processes, succulents, and those with any number of anatomical adaptations such as phyllodes, cladodes, sunken stomata, thickened cuticles and epidermal appendages such as hair and scales, designed to limit transpiration and thus water usage (Blackwell, 1998:267-269).

3.7 Ornamental plants in the commercial environment

3.7.1 General trends in consumer markets

Consumer tastes in ornamental plants are mostly driven by fashion trends and can be very difficult to predict as they change constantly (Cadic & Widehem, 2001:77; Segers, 2001:16). It often happens that by the time a new product enters the market, the particular trend has passed and consumers are not interested in that product any more. This is all the more likely to occur with improved plants as the duration of breeding programmes may span several years, overlapping changes in fashion and consumer tastes. These authors state that market acceptance cannot be guaranteed, no matter how highly a grower may think of his or her own product.

According to Cadic & Widehem (2001:78), this situation could be avoided by trying to forecast consumer tastes through surveys. These authors furthermore state that not many surveys have been published although surveys may be of strategic importance to growers or breeders. However, general trends can be determined by observing the consumption of horticultural products such as fruit and vegetables.

Cadic & Widehem, (2001:78), found that general goals for horticultural research should be:

- Protection of the environment.
- Improvement of product quality.
- Protection of human health.
- Development of new products.

According to Cadic & Widehem (2001:78), European countries are increasingly showing concern for the protection of their environment. Regulations concerning the saving of water have been improved, with the result that growers are recycling nutritive solutions and more rational uses

of pesticides and chemical fertilisers are employed.

Environmental demands are taken into consideration by supermarkets and large-scale distributors as well. According to Cadic & Widehem (2001:78), they request from their suppliers:

- Consistent high quality.
- A regular supply of homogenous products.
- Evidence of the origin of products.
- Safe production methods of the plants they are selling, for instance a record of spraying.
- Certification of the absence of any risk to the population and environment.

Park and garden authorities prefer:

- Trees and shrubs that need no spraying against pests and diseases.
- Trees and shrubs of which the maintenance costs are low.

According to Segers (2001:15), variation is needed (for example in flower colour, shape or size to allow proper profitable commercial placement of products) but uniformity is essential within a variety. Breeders can focus breeding targets for their cultivars in two ways, either on consumer needs or on economic benefit for the grower; the two being inter-connected.

3.7.2 Consumer demands for outdoor plants

Comparable to any other product that is new on the market, some ornamental plant introductions will prove profitable, whereas others will fail. It is essential to know what the customer wants in terms of quality – not only to increase the chances of a new product being accepted, but also to improve customer satisfaction with existing plants (Townesley-Brascamp & Marr 1995:199).

According to Berninger (1978:286), the following factors should be analysed when evaluating the quality of plant material:

- Recommended cultivar.
- Colour of foliage.
- Condition and extent of root system.
- Size and number of flowers.
- Freedom from mechanical injury, insects and disease organisms.
- Size and uniformity of crop.
- Height (neither too short nor too tall).
- Maturity – production period.
- Symmetry and compactness of plant.
- Plant well-proportioned to size of root ball or container.
- Absence of weeds in the container.

To cater effectively for the needs of their customers, those involved in the production, development, or marketing of ornamental plants furthermore need to be aware of the relative importance customers attach to various plant characteristics. Townsley-Brascamp & Marr (1995:199) identified several aspects of importance to the consumer. Price, plant health, suitability for the consumer's garden, final height, shape, bushiness and leaf colour all played a significant role in consumer preference. The effect of a change in price level depended on the final height of the plant. A significant interrelationship was also found between shape and bushiness of the plant. The factors selected by these authors for an interview with garden centre customers were:

- Price.
- Health.
- Suitability for respondent's garden.
- Labelling.

- Final height.
- Shape.
- Flower colour.
- Bushiness.
- Leaf colour.

Respondents were generally in agreement over the most preferred factors, except for flower colour, leaf colour and final height, for which a large proportion did not have a preference. Respondents furthermore tended to regard both bushiness and the absence of pests and diseases as a sign of health. Health moreover had the largest effect on preference. This fact stressed the importance of the health maintenance of plants in garden centres and of research into pest and disease resistance.

The research by Townsley-Brascamp & Marr (1995:205) showed that consumers had an order of preference for garden plants:

1. Health being the most important factor.
2. Suitability for the garden.
3. Shape.
4. Bushiness.
5. Final height.
6. Price.
7. Leaf colour.

According to a survey by Stanley (2003:16), priorities in order of importance for plant purchases in a garden centre relate to:

1. Name of the plant.
2. Height of the plant.
3. The colour of its flowers.
4. The scent.
5. Its non-poisonous nature.

6. Price.

Both these authors found that price is low on the importance ratings of consumers. Townsley-Brascamp & Marr (1995:205), found that the significance of responses to a plant's suitability for the respondent's garden and its final height indicated how important it is for this type of information to be provided on the labels of plants.

The underlying desire for information by the consuming public is often as important as the product itself. Nelson (1985:536) states that the grower should provide identification and cultivation information with each unit sold to a consumer. It is furthermore the grower's responsibility to educate the retailer as to how the product is to be handled during marketing. The grower should in addition supply information which the retailer can pass along to the consumer. This responsibility is particularly important in mass-market channels, where merchandisers often have little experience in handling plants. Some larger growers supplying mass markets have found it advantageous to work with the management of chain stores to train their produce managers to properly handle floral products and plants.

Townsley-Brascamp & Marr (1995:205) concluded that at an average price level, it was more important to respondents to purchase a plant with the preferred final height than at either a low or a high price level. These authors summarise that a healthy, bushy plant, suitable for the customer's garden, with dark green leaves, an average final height and a balanced shape was the most desirable plant for garden centre customers. To ensure customer satisfaction and repeat sales, it is also of importance that plants should be durable.

3.7.3 Consumer lifestyle and behaviour influencing plant choice

Stanley (2003:18) identified several significant consumer behavioural patterns that influenced their plant choice in a garden centre. He found that 60% or more of purchases in garden centres are made on impulse, but many customers come for a reason – they plan to purchase specific products. According to Stanley (2003:18) these “purpose products” are important product ranges or key products and include:

- Bedding plants.
- Potting soil.
- Roses.
- Flowering perennials.
- Slug and snail control.
- Christmas trees (in season).

According to Stanley (2003:19), the opposite of a purpose product is an impulse product, an unplanned purchase when the consumer enters a garden centre, because he or she is inspired by it rather than need it. This author identifies impulse products to fall into a number of categories:

- Plants in flower.
- Products that have become fashionable (trend products).
- Fad products (a craze rather than a fashion).
- Products recently promoted in the media.
- Products being promoted by suppliers with promotional material supplied.

According to Stanley (2003:19), these impulse items create the interest in a garden centre.

Stanley (2003:20) furthermore identified certain products that customers

need to “browse shop” and hence need more space and time for while they make buying decisions. Browse products include:

- Seeds.
- Perennials.
- Herbs.
- Fruit trees.
- Books and catalogues.

For these products, departmental signage is critical, and the customer needs to be able to find the department easily and out of the major customer route.

Sittig (2003), states that lifestyle changes of garden centre consumers should be considered when a choice of plants to supply is to be made. Town houses, security villages and retirement villages are major new developing housing types. All these have smaller gardens and patios and in addition make use of container gardening. This author states that the “cocooning” lifestyle will gain much more momentum in the 21st century, and it means that a lot more time is spent at home and in the garden. Furthermore today’s people live in an era where everything happens very quickly, and people want instant results and information on how to succeed. People moreover love flowers and colour, and will buy almost anything if in flower.

According to Sittig (2003), plants and products in demand for smaller gardens are:

- Bedding plants, grown from seed (seedlings) and cuttings (rooted).
- Perennials (flowering herbaceous plants).
- Small flowering shrubs.
- Herbs.

- Instant container gardens.
- Hanging baskets.

Consumers seem to have very specific and lifestyle orientated needs in terms of ornamental plant characteristics. These features could provide useful guidelines to growers and breeders as to what types of plants to grow and how these plants should look and behave.

3.7.4 Grower's and plant breeder's issues

According to Segers (2001:16) aspects to consider when setting cultivar breeding targets are that new varieties should possess those specific characteristics that result in the consumer wanting to buy the product, for example a specific shape, size, or colour. Consumer needs can furthermore be quality aspects such as long product life and transport tolerance. Additionally, there are differences between consumer preferences of the various regions of the world.

For the grower, new cultivars must be profitable to grow from an economic point of view. Crops must therefore have characteristics such as low maintenance costs and high production yields of good quality plants through all seasons. The grower furthermore has to decide which cultivars he or she wants to cultivate in order to follow trends in consumer needs. Cultivars that are subject to trends usually have a shorter commercial life span (Segers 2001:16).

Technical targets for growers can be cultivation techniques (the greenhouse, substrate cultivation, tissue culture), labour needs of the crop (ease of handling, processing and sorting; regular growth), low energy needs of the crop, and resistance to pathogens (Segers 2001:17). Resistance to pathogens will lower the entrepreneurial risks of the grower

because less damage can occur to the crop during cultivation and transportation. According to the author, integrated pest control management will be important in the future. For ornamental breeding, this means that different pathogen resistances will be required in the future and will consequently demand higher investments (Segers 2001:18).

Segers (2001:15) states that the relatively low number of plants sold per successful cultivar means a high cost per plant where development work, breeder's licences and promotion are concerned. This author furthermore states that the relative short commercial life cycle of most varieties adds to the cost.

According to Cadic & Widehem (2001:75), the ornamental plant breeder's main activity remains the building of new genetic combinations that will become new varieties, sometimes several years later, while the world economy, international trade and consumer requirements are always changing. Segers (2001:19), states that the broad range of plant characteristics enforces the grower's or breeder's need to determine specific targets and develop selection methods for these specific targets.

According to Cadic & Widehem (2001:80), the major changes in the ornamental horticulture trade at international level that have lead to the adaptation of breeding goals for new ornamental plants are:

- An increase in consumption.
- The development of new production techniques.
- Changes in consumers' tastes.
- Possibilities offered by genetic transformation.
- The registration of plant breeder's rights.

Plant protection through plant breeder's rights is encouraging the development of new varieties (Cadic & Widehem, 2001:80).

Growers and plant breeders can protect their cultivars from unauthorised use with the help of plant breeder's rights in member countries of the International Union for the Protection of New Varieties of Plants (UPOV) of which South Africa is a member.

A patent or plant patent or PBR (Plant Breeder's Right) is a grant given by the government that allots the inventor exclusive rights to an invention for a certain period, e.g. 15 – 20 years. Before applying for a patent, an inventor must:

- Establish novelty.
- Document the device or in this case, the plant.
- Research existing patents.
- Study the research results.
- Submit a patent application to the government patent and trademark office.
- Impeach the application.

A trademark is often linked to the name of the product and is an effective method of identifying and protecting new cultivars (Segers, 2001:18). A trademark is any distinctive word, symbol or trade dress that a company uses to identify its product or to distinguish it from other goods. It serves as the company's "signature" in the marketplace (Scarborough & Zimmerer, 2000:774).

According to Segers (2001:18) and Cadic & Widehem (2001:80), plant variety protection has long been a strong motivation for the breeding of new varieties, allowing breeders financial return in the form of royalties. There is a strong correlation between the number of applications for protection and the economic importance of a crop. The number of applications for more recently introduced crops such as *Osteospermum* is increasing rapidly.

This might have favourable effects on species new to cultivation, a frequently occurring situation with ornamentals, encouraging breeders to develop still more improved cultivars. Protection has furthermore been extended to harvested products coming from new varieties, as well as to secondary metabolites such as essential oils extracted from the flowers or other parts of the new variety. This disposition might have an effect on the possibility of broadening the use of ornamental plants, for example as industrial plants (Cadic & Widehem, 2001:80).

Cadic & Widehem (2001:81) conclude that diversification in ornamental horticulture through the use of new genera and species will increase, and for some of the crops new breeding programmes will be launched to provide more suitable varieties. Consumer tastes in the long term will be strongly influenced by an increasing concern for the quality of products and environmental protection.

3.8 Horticultural criteria for ornamental plants

Some of the issues identified by plant breeders and growers that need to be addressed before a species or cultivar is included in research or production programmes are:

- The plant must be economical to produce – high yield at low production cost; low cost of crop maintenance; low energy requirements (heating and lighting).
- The plant must be relatively easy to propagate – techniques (seed, cuttings, bulbs, tissue culture) must suit the producer, greenhouse or outdoor conditions and the substrate.
- The product must have good transportability – tolerance for physical handling, and stress tolerance during and after transport in a changed environment are important.
- The plant must have resistance to major pathogens.

- The plant must have good quality retention at all times.
- The plant must comply with labour needs – ease of management; processing and sorting must be uncomplicated.
- Plants should be of regular growth – to ease handling, and to fulfil the consumer’s need for standardisation.
- The producer must be able to grow and supply the plant throughout all seasons.
- The product must have an adequate commercial life expectancy.

According to Armitage (1998:251), research programmes regarding horticultural criteria for ornamental plants usually focus on the growth sectors in the market. He states that the selection of, and research into, new crops in the New Crop Programme at the University of Georgia in the United States of America focuses on three main areas, namely flowering pot plants, potted perennial plants and new landscape plants for the landscape or garden market and are strictly viewed as outdoor plants. Speciality cut flowers (other than the well-known mass produced crops such as roses, carnations and chrysanthemums) produced in the field or greenhouse is furthermore regarded as a growth sector in the North American market.

According to Armitage (1998:252), one of the most important and often overlooked aspects of new crop studies is the development of protocols for the elimination of taxa from the programme. The selection and elimination of species becomes important due to limitations of funding, space and personnel at research institutions.

When selecting plants for study they may consist of new cultivars or new species to horticulture, or may represent a new use for an existing taxon. Criteria vary according to the plant’s proposed end use. Taxa with colourful flowers or foliage propagated reasonably easily and that are free from serious pest and disease problems are candidates for entering the

programme.

Crop turnover is important in the market. Plants that grow and flower quickly are more likely to be adopted by industry than those that take a longer period of time (Armitage, 1998:252). According to him, growers and distributors are invited by research universities in the USA to participate at any stage along the progression of a potential new crop. They are invited to suggest taxa for study, view the crops in progress, and incorporate them into their crop mix as well.

Armitage (1998:252) furthermore states that the acceptance of new crops by the industry is never guaranteed and is especially difficult in the flowering pot plant market. One of the difficulties in assessing new crops is the many potential choices for study. There are hundreds of taxa loosely fitting the selection criteria mentioned, and the programme can quickly be inundated with new plants. It is therefore important that the scientist has a plan whereby taxa may be eliminated from the study.

According to Armitage (1998:252) protocols for maintaining a crop trials or eliminating it, can be made at four different stages, depending on the market position the plant is to fill. The final decision to proceed or eliminate is based not only on the objective steps outlined below, but moreover on the inherent potential of the plant to become accepted in the domestic market. Armitage (1998:252) states that the dominance of certain existing crops in the market and stringent post-harvest limitations make the entry of new plants into the market difficult.

Armitage (1998:254) suggests that excellent garden performance is a prerequisite for landscape (amenity) plants. This is demonstrated by persistent flowering or colourful foliage throughout the growing season. Ease of production and the absence of serious diseases and pests are

important as well.

Armitage (1998:254) identified three stages in the selection process for landscape plants:

1. Plants are placed in horticultural trial gardens and are evaluated during the growing season. If they perform poorly, as demonstrated by poor flowering, disease and pest susceptibility, or inability to cope with conditions in the given geographic area, plants are eliminated. A minimum of 12 weeks of good garden performance is necessary to maintain the taxon in the programme.
2. Plants must be scheduled, particularly for the spring and autumn markets and if many problems still persist after environmental experimentation is completed, taxa may be eliminated.
3. Plants must be propagated readily and be produced in no more than 12 weeks. In general, only vegetative propagated material is selected for the University of Georgia programme. However, if seed is the only source of propagating material, the ease of vegetative propagation is determined. If propagation is extraordinarily difficult and if clone material cannot be obtained, elimination of the taxa is considered.

Armitage (1998:254-255) states that there is no government or state-wide industry funding in the USA for new crop research, and that funding for the horticultural sciences is meagre. Therefore he recommends that, in order to maintain a programme for the introduction of new ornamental plants, creative funding such as patenting new crops with potential, and doing contract research in collaboration with sponsors from the industry is required.

3.9 Conclusion

The relevant underlying factors influencing the selection of new ornamental plants have been identified and discussed. Possible factors that may influence the horticultural use of indigenous plants in a positive or negative way have been identified and applied to the South African scenario. These factors include:

- Environmental issues.
- Commercial competition in the horticultural use of South African indigenous plants.
- Difficulty in the domestication of wild plants.
- Sources of new ornamental plants.
- Natural attributes of plants.
- Consumer needs of ornamental plants.
- Grower's and plant breeder's financial and legal issues.
- Horticultural criteria for ornamental plants.

The interest and awareness of the environment and increased consciousness of personal health has a strong positive influence on horticulture, especially the use of indigenous plants the world over. This has furthermore given a new approach to horticulture and “greening” of the environment.

New international policies such as the CBD introduced during the 1990s aim to protect the environment and natural resources, but make introduction of new plants from the wild more difficult. Furthermore, the domestication of wild plants is a demanding process and the development of commercially successful and profitable ornamental plants is difficult.

From investigating the sources of new plants introduced onto the markets, it appears that many new plants are in reality “old” plants that are “re-cycled” in one way or another and not entirely “new” as in something never seen before.

It is clear that although South Africa is well known for its rich flora, there is considerable competition in the commercial environment for the horticultural use of its flora. A good knowledge of the markets and future trends is therefore essential when selecting plants for this purpose.

Some plants can be used just as they are found in nature, while others benefit greatly from improvement and breeding to obtain certain sought-after characteristics. This is especially the case with floricultural crops such as cut flowers, flowering pot plants and bedding plants.

When suitable plants have been sourced, named, selected and successfully domesticated, they often go through a period of research and development at a research centre. Improved plants may be registered and royalties collected by the plant breeder. The final stage these plants have to go through is the commercialisation process. Failing to do proper marketing may negate all previous research and development efforts. The route of an ornamental plant from nature to the consumer is illustrated in Figure 3.9.1.

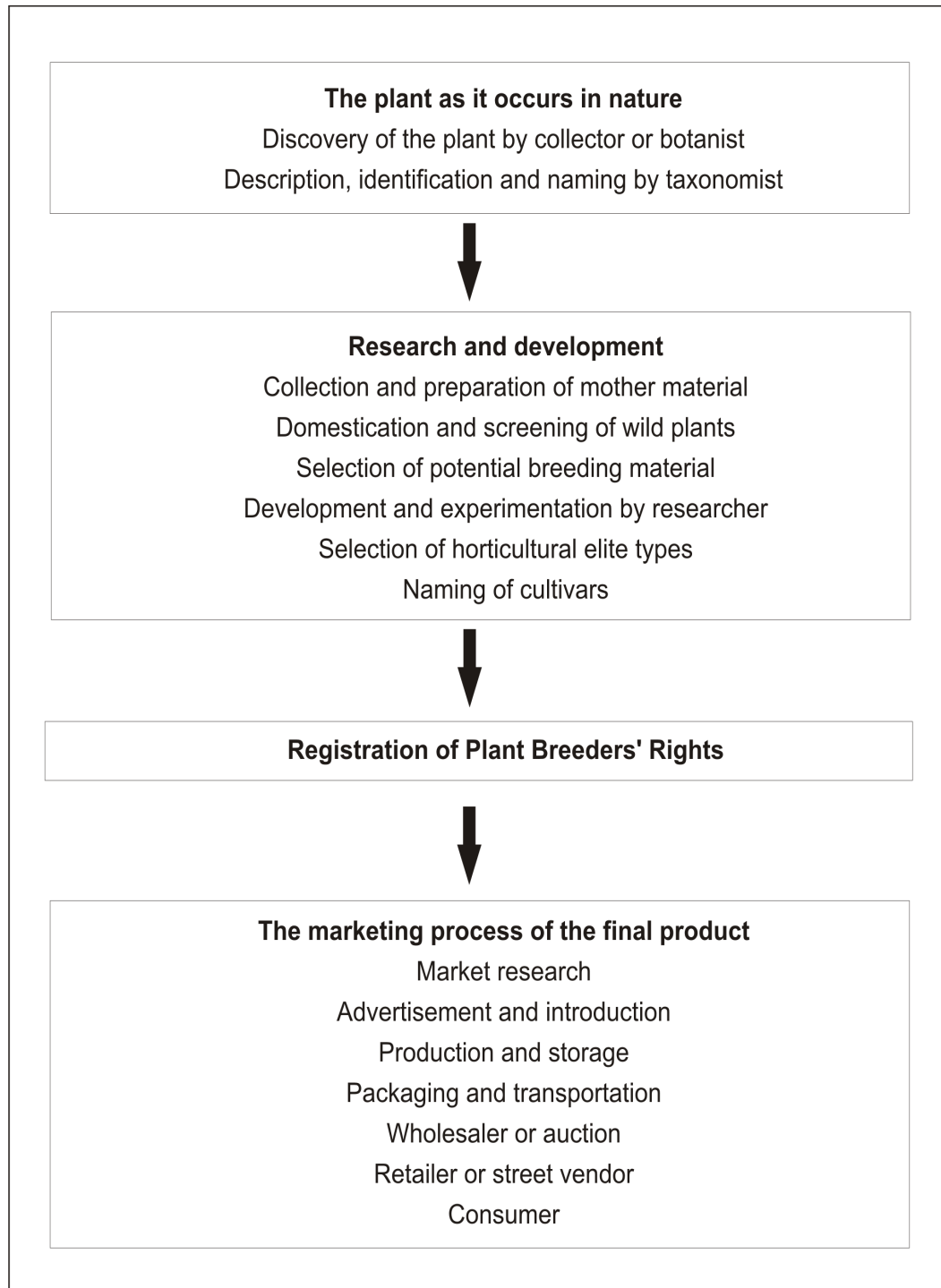


Figure 3.9.1 The route of an ornamental plant from nature to the consumer

From an analysis of the objectives and processes of ornamental plant selection and sourcing, it is clear that certain specific problematic ornamental plant issues should be addressed during the selection process. The consideration of factors other than only the physical characters of plants in the selection process, i.e. consumer needs and market trends, be used and further developed in South Africa and should therefore be promoted.

Preliminary conclusions indicate various degrees of neglecting the importance of market influences on selection criteria of ornamental plants in South Africa. In Europe and the USA, consumer needs are considered in a more specific way when making a choice of new ornamental plants for the markets and contains possible suggestions to address some of these inadequacies in the selection process in South Africa.

From an analysis of the underlying factors influencing the selection of new ornamental plants in Chapter 3, it is clear that certain specific problematic ornamental plant issues need to be addressed during the selection requirements that govern them. These criteria for ornamental plant selection will be verified in Chapter 4 by means of a survey amongst various role players in the horticultural use of indigenous plants in South Africa.

CHAPTER 4

THE SURVEY AND RESULTS OF THE SURVEY

4.1 Introduction

In this chapter the validity of the problematic issues of ornamental plant selection that have been identified in Chapter 3 will be evaluated by means of data gathered by appropriate research methods.

Institutions were visited and events attended, from which relevant data and important information were obtained in formulating the perceived problematic issues for the horticultural use of indigenous plants in South Africa. Refer in this regard to Section 1.8.3 in Chapter 1.

A number of research methods were considered for gathering the quantitative data required to confirm or reject these problematic issues for the horticultural use of indigenous plants in South Africa. Interviews with all the sectors of the nursery and landscaping industry, which are spread over the whole country, would have been logistically impractical. Data thus gathered would still require some confirmation in terms of the regularity of the perceived problematic issues for the horticultural use of indigenous plants.

An analytical survey approach by means of a questionnaire was considered to be logistically achievable and the questions could be structured to yield comparable data between the data categories. The statistical analysis of this data may deduce certain meanings or distinguish certain patterns that could justify recommendations or deserve further investigations. In the section on Research Methodology of Chapter 1

Sections 1.8.3 and 1.8.4 the motivation for the use of the technique to gather data, specifically of a quantitative nature, was discussed. The methodology to be used in compiling and pre-testing the questionnaires will be investigated in Sections 4.2.1 to 4.2.4. This quantitative data, together with the qualitative data gathered in Chapter 3, will then be used to formulate recommendations in Chapter 5, including an outline of issues to be addressed.

The information required to compile the questions in the survey was gathered from the following investigations and analysis:

- An investigation into the history of ornamental plant use, and its fundamental value in human life, to determine consumer knowledge and attitudes towards ornamental plants in general and indigenous plants in particular, and the reasons why ornamental plants are acquired. Refer to this regard to Sections 2.3.1 to 2.4.5 in Chapter 2.
- A review of publications and an analysis of the different issues that may initiate commercial competition for the horticultural use of indigenous plants in South Africa, or may limit the use of indigenous plants in ornamental horticulture, focusing on their applicability in South Africa. Refer to Sections 3.3, 3.4 and 3.5 of Chapter 3.
- A review of publications, and an analysis of the different pertinent issues in ornamental plant selection in South Africa, and selected other countries, with the purpose of identifying relevant selection criteria for the nursery and landscape related trade, and also to identify applicable experience and potential indicators toward solutions or criteria for a South African context. Refer in this regard to Section 3.2 and Sections 3.6 to 3.8 of Chapter 3.

4.1.1 Issues concerning the growers of ornamental plants in South Africa addressed in the survey questionnaire

- What is the value of ornamental plants in terms of the physical, psychological and economic environment?
- What and where are the sources for new ornamental plants?
- What are the selection criteria for ornamental plants?
- What is the competition for South Africa and its flora?
- Do wild plants need to be domesticated before they are suitable for use?

The above mentioned questions were put forward during the visits to the following institutions and growers:

4.1.1.1 Institutions, botanical gardens and distinctive gardens – South Africa

- The Lowveld National Botanical Garden and its nursery, Nelspruit, Mpumalanga, South Africa.
- The Pretoria National Botanical Garden and its bookshop and nursery, Pretoria, South Africa.
- The Walter Sisulu National Botanical Garden and its nursery contracted to 'Random Harvest' indigenous nursery, Randburg, South Africa.
- The Karoo Desert National Botanical Garden and its succulent and bulb nursery, Worcester, Western Cape, South Africa.
- Kirstenbosch National Botanical Garden and Cape flora nursery and bookshop, Cape Town, South Africa.
- Durban Botanical Gardens, Durban, KwaZulu-Natal, South Africa.
- SALI (South African Landscapers Institute) Awards

Gardens 2004; Brenthurst, Anglo American office building and Johannesburg Civic Theatre gardens, as part of the Johannesburg City Centre renovation project.

- Lost City Gardens, Sun City, Southern Sun Hotel, Rustenburg, South Africa.
- Monte Casino Tuscan Gardens, Fourways, Johannesburg, South Africa.
- Roodeplaat Vegetable and Ornamental Plant Institute, Agricultural Research Institute, Pretoria, South Africa.

4.1.1.2 Institutions, botanical gardens and distinctive gardens – abroad

- Proefcentrum voor Sierteelt (PCS), Research Centre for Ornamental Plants, Destelbergen, Belgium.
- The National Botanic Garden of Belgium, Meise, Belgium.
- The “La Conception” Historical and Botanical Garden in Malaga, Spain.
- The Cordoba Botanic Gardens, Andalusia, Spain.
- The Gibraltar Botanic Gardens, Gibraltar.

4.1.1.3 Ornamental plant growers – South Africa

- Boskop Nursery - azaleas, camellias, conifer gardens.
- Flora RSA (Pty) Ltd, t/a Patryshoek Nursery - specialist indigenous nursery, De Wildt.
- Gariep Nursery - small succulents, exporters, Pretoria.
- Geoff Botha cut flower nurseries - gerbera and carnations.
- Kokerboom Succulent Nursery, Van Rhynsdorp - aloes, mesembs and other indigenous succulents.
- Kruger National Park Indigenous Nursery, Skukuza.
- Ludwig Taschner Rose Growers.

- Magenta Wholesale Plant Distributors.
- Malanseuns Wholesale - growers of seedlings, landscaping and gardening plants.
- Nieuwoudtville bulb nursery - *Lachenalia* and other bulbs.
- Random Harvest - specialist indigenous nursery, Randburg.
- Safropa cut flower nurseries – chrysanthemums.
- Simply Indigenous - specialist indigenous nursery, Hartbeespoortdam.
- Witkoppen - specialist indigenous nursery, Fourways.

4.1.1.4 Ornamental plant growers – abroad

- Gediflora, Oostnieuwkerke, Belgium.
- Orgideeënkwekerij Coupé, Melle, Belgium.
- Willy De Nolf, Waregem, Belgium. Member of 'BEST-select', a cooperative shrub and tree selection project between the nursery stock breeding programmes of the Institute for agricultural and fisheries research (ILVO) Plant Sciences Unit Applied genetics and breeding and 22 Belgian hardy stock nurseries. BEST-select combines:
 - Creation of an innovative assortment of plants.
 - Breeding know-how.
 - Exclusive distribution of new releases by the members.
 - A joint promotion and marketing strategy.

4.1.1.5 Symposia, seminars and conferences

- European Association for Research on Plant Breeding (EUCARPIA) – Section Ornamentals Symposium, July 2001, Melle, Belgium.

- Joint International Conference of the South African Association of Botanists (SAAB) and the International Society for Ethnopharmacology (ISE) 2003, Pretoria, South Africa.
- Parks & Grounds Green Industries Conference, April 2003, Randburg, South Africa.
- Succulenta 2000. Succulent Society of South Africa Congress, Kirstenbosch, Cape Town, South Africa.
- Southern African Association of Science and Technology Centres (SAASTEC) 4th Annual conference, 2001, Malelane, Mpumalanga, South Africa.
- Southern Education Research Alliance (SERA) Intellectual Property Seminars, Pretoria.
- International Plant Propagator's Society (IPPS) Annual conference, Pretoria, 1999.
- Post-graduate symposia and seminars of the past 15 years, Department of Plant Science, University of Pretoria.

4.1.2 Issues concerning the consumers of ornamental plants in South Africa addressed in the survey questionnaire

- What selection criteria for ornamental plants are important to a consumer?
- How can growers meet the changing demands of consumers?
- How should markets for horticultural products be approached?

These questions were put forward during the visits to the following trade shows:

4.1.2.1 Trade shows – South Africa

- DesignEx landscape design competitions, Safari Garden

Centre, Pretoria.

- Gardenex Growtech horticultural, agricultural and gardening exhibitions, Randburg.
- Malanseuns trade days, Bon Accord, Pretoria.
- South African Nursery Association (SANA) trade days, Knoppieslaagte, Midrand.

4.1.2.2 Trade shows – abroad

- Floriade 2002, Aalsmeer, The Netherlands

4.2 The Survey

4.2.1 The survey questionnaire

Leedy (1985:135) finds the survey questionnaire to be an appropriate instrument of observing (gathering) data beyond the physical reach of the observer. It is the most widely used data gathering technique.

Neuman (2000:250) states that when developing a questionnaire the researcher conceptualises and operationalises variables as questions. Questions are organised in the questionnaire based on the research topic, the respondents and the type of survey. In addition the researcher must plan how to record and organise the data for analysis.

A survey questionnaire has the advantage of being given or sent to respondents directly. They can then read the instructions themselves, and respond by answering in a predetermined manner for efficient data analysis.

The researcher can also send the questionnaires to a wide geographical area. Neuman (2000:271) suggests that the survey questionnaire is a cost

effective tool, which can be conducted by a single researcher.

The disadvantages of a survey questionnaire lie primarily with the possible low response rate, as well as with the researcher's inability to control or monitor the conditions under which the mailed questionnaires are completed.

Since the questionnaire is an impersonal probe or tool, Leedy (1985:135) suggests that it should satisfy the following requirements:

- Clear language should be used to solicit precisely what the researcher wishes to learn. The researcher should inspect the assumptions underlying the questions and ascertain if these assumptions fit the realities of life.
- Questions should be designed to provide answers to a specific research objective. The researcher should avoid aimless and vague questions and careless imprecise expression.
- When sending out a questionnaire by mail or e-mail, the respondent should be informed in a covering letter (Addendum C) accompanying the questionnaire as to its objectives and possible potential benefit to him or her.

4.2.2 Design of the survey questionnaire

In designing the questionnaire the following considerations should be kept in mind to ensure its success as a research tool:

- *Length of the questionnaire:* Despite the advantages that a long questionnaire has for the researcher, respondents may find it tedious to complete. In this study the two questionnaires were four and six pages respectively.
- *Question sequence:* The order in which the questions are put should relate to the context of answering specific questions before others in

order to avoid confusion with the respondent.

- *Expected response rate*: Neuman (2000:266) finds that researchers become cautious about generalising from a low response rate since this may create a bias and weaken the validity.
- *Format and layout*: Neuman (2000:269) suggests that questionnaires should be clear, neat and easy to follow. Any instructions on how to respond should be printed in a different style from the questions. In this study's case the questions were printed in a bold font, and the different options from which the respondent could select were printed in a normal font.
- *Open ended or closed questions*: Questions can be formulated to be open-ended, e.g. *What do you consider to be problematic issues in sourcing new ornamental plants?* or closed in cases where respondents are given a range of options only. The questionnaire may also contain statements to which the respondent is requested to react. In this study there was only one open question with the rest being closed or statements that had to be responded to.
- *Total design method*: A survey is a social interaction in which the respondents act on the basis of what they can expect in return for their cooperation, the social costs in terms of time spent should be commensurate with the expected benefits or with the feeling that they are doing something of value or being important (Neuman, 2000:270). Refer in this instance to the covering letter (Addendum C) accompanying this research project's questionnaires.

4.2.3 Issues addressed in the survey questionnaires of this study

The perceived problematic ornamental plant selection issues that were put to respondents to confirm or reject were formulated through the structured and informal or less structured interviews and observations made at institutions and events and included:

- Consumer knowledge and attitude towards indigenous plants.
- Market demand and consumer selection criteria.
- Industry trends and market possibilities.
- Growers' selection criteria.
- Competition and limitations to the utilisation of indigenous plants for horticultural purposes.

The questionnaires were aimed at determining respondents' opinions on the issues pertaining to ornamental plant selection by:

- Importance rating.
- Usage patterns.
- Opinions on difficulties.
- Perceived problematic issues were put to respondents to confirm or reject.

Most of the questions were the same for each of the two categories (institutions involved with the *growing* of ornamental plants, and institutions involved with the *consuming* of ornamental plants) in order to achieve some affirmation across the industry perspective. However, some questions were category specific and not applicable to the other category.

Section 4.4 contains the wording of the questions in each category and the objectives with the asking of those questions.

4.2.4 Pre-testing the questionnaire and ethical considerations

In this research, the researcher pre-tested the questionnaire on two representatives from each of the target groups. From the resultant feedback and comments this researcher concluded that some questions were unclear, too complicated, irrelevant, incomplete or too lengthy. The

questionnaires were adapted to correct these objections and re-tested.

The re-test was done on three representatives of each category. The number and scope of questions were still too large and subsequently the number and complexity of the questionnaires were reduced. A duplication of certain questions was also detected and corrected accordingly.

Before sending the questionnaire to respondents, the researcher presented them for vetting to the University of Pretoria's Faculty Committee for Research Ethics and Integrity.

An 'informed consent' form was sent with the questionnaire whereby a participant in the survey was assured of confidentiality of the information and anonymity of the respondent.

4.2.5 Selecting a target population

Leedy (1985:144) suggests that the results of a survey are no more trustworthy than the quality of the target population or the representativeness of the sample. He (1985:147) furthermore suggests that the sample should be chosen with great care in order to enable the researcher to see all the characteristics of the total population in the same relationship as he or she would factually see them.

4.2.6 The categories of questionnaires of this study

This study analysed the responses from two different categories involved with horticulture, landscaping and trade in ornamental plants, i.e.:

- Category 1. Growers of ornamental plants and scientists in the field of horticulture.
- Category 2. Retailers in ornamental plants and professionals and

knowledgeable parties in the field of landscaping.

4.2.7 The survey target populations of this study

It is the researcher's belief that the two target populations are sufficiently different from each other to motivate two different questionnaires. There was however an attempt to identify certain issues that could be considered to be common to all the categories and that the comparative results from the two categories would yield information that would assist in formulating more valid recommendations.

To determine the most appropriate method to identify the target populations for each category, the following aspects were considered:

The most appropriate target populations for Category 1 were institutions involved in aspects of the growing of ornamental plants, and which included:

- Large growers (mass production).
- Medium to small sized growers.
- Specialist growers.
- Indigenous growers.
- Research Institutions.
- Botanical gardens.

The most appropriate target populations for Category 2 were institutions or individuals not involved with the growing of ornamental plants as such, but involved with supplying or servicing the consumer of ornamental plants, and which included:

- Large life style garden centres.
- Medium to small sized garden centres.

- Specialist retail nurseries.
- Indigenous retail nurseries.
- Landscape and garden maintenance operations.
- Landscape architects.
- Landscape contractors.

The survey was undertaken country-wide in South Africa, including all nine provinces. This would ensure that all climatic regions were represented in the survey.

4.2.8 Questionnaires sent out and responses received

Questionnaire were sent to all members (100% of the target population) of the organized formal sectors, organizations and institutions working directly with ornamental plants in South Africa (excluding students and the allied trades e.g. irrigation, lawnmowers and machinery, organics and soil mixtures, hard landscaping supplies and building materials).

A number of uncompleted questionnaires were returned for several reasons, including returned to sender (RTS) postal boxes closed or unknown, businesses closed or respondents unable to complete a questionnaire for other reasons, e.g. moved overseas, working overseas or people not working at the institution any more.

Tables 4.2.8.1, 4.2.8.2 and 4.2.8.3 show the number of questionnaires sent and the number of responses received.

Table 4.2.8.1 Number of questionnaires sent out and the number of responses received from Category 1, ornamental plant growers.

CATEGORY 1: ORNAMENTAL PLANT GROWERS			
DATA CATEGORY	POPULATION	SAMPLE SIZE	METHOD
SALI (South African Landscapers Institute)			post and subsequent e-mail
Gauteng	11	11	
Cape	7	7	
Kwazulu Natal	5	5	
SANA (South African Nurserymen Association)	74	74	post and subsequent e-mail
Research Institutions	13	13	post
Botanical Gardens	16	16	post
Authors contacts	25	25	post and personal delivery or interview
TOTAL	151	151	

Table 4.2.8.2 Number of questionnaires sent out and the number of responses received from Category 2, garden centres, retail nurseries, landscape architects and landscape contractors.

CATEGORY 2: GARDEN CENTRES, RETAIL NURSERIES, LANDSCAPE ARCHITECTS AND LANDSCAPE CONTRACTORS			
DATA CATEGORY	POPULATION	SAMPLE SIZE	METHOD
SALI (South African Landscape Institute)			post and subsequent e-mail
Gauteng	81	81	
Cape	33	33	
Kwazulu Natal	29	29	
SANA (South African Nurserymen Association) Garden Centres	113	113	post and subsequent e-mail
ILASA (Institute of Landscape Architects of South Africa)	132	132	post
Authors Contacts			Post and personal delivery or interview
Landscape Industry	7	7	
Garden Centres	4	4	
TOTAL	399	399	

Table 4.2.8.3 Total number of questionnaires sent out in the survey and the number of responses received.

DATA CATEGORY	POPULATION	SAMPLE SIZE	(RECEIVED) RESPONSES (100% SAMPLE SIZE)		
			NOT COMPLETED	COMPLETED	TOTAL
Category 1: Growers	151 (100%)	151 (100%)	6 (3.9%)	65 (43%)	71 (47%)
Category 2: Retailers and Landscapers	399 (100%)	399 (100%)	18 (4.5%)	126 (31.5%)	144 (36%)
GRAND TOTAL Category 1 & 2	550 (100%)	550 (100%)	24 (4.3%)	191 (34,7%)	215 (39%)

4.3 Specific treatment of the main problem and sub-problems

In this section the main and sub-problems stated in Chapter 1 are repeated to simplify orientation and the way in which they have been dealt with by the data derived from the questionnaire survey is discussed.

4.3.1 Main problem

Problematic selection issues in respect of sourcing new ornamental plants from indigenous South African flora arise when using only the physical characteristics of plants. There are important consumer needs that are not

sufficiently met by growers, and growers' issues that are not sufficiently addressed by the research institutions and in the selection processes that may require attention by the growers and research institutions in the sourcing of new ornamental plants. In addition, there are a number of factors limiting the range of horticultural uses of indigenous plants in South Africa. The use of indigenous plants is also subject to competition from exotic plants in the market.

The main problem assumes that the problematic selection issues arise when using only physical characteristics of plants when new ornamental plants are sourced from the indigenous flora in South Africa, and as a result the flora may be horticulturally underutilised.

The responses to question numbers 6.9 to 6.21 (to all) and 8.16 to 8.34 (to growers) were intended to provide confirmation of the characteristics mostly used for ornamental plant selection as well as of those problematic issues identified in the visits to institutions and events. Other problematic selection issues could also be identified from the comments made by respondents.

In Section 4.4 (the data and their interpretation) and Addenda D, E, F, G, H and I (Responses to questionnaires) hereafter the responses to the above questions are given and discussed.

4.3.2 Sub-problem 1

Identifying the problematic issues related to the criteria for selecting indigenous South African flora as new ornamental plants in horticultural applications and producing solutions to overcome or mitigate their effects.

It is hypothesised that appropriate selection criteria for ornamental plants can be formulated to address the needs of consumers when making a purchase

decision on new plants; and the needs of growers in their making decisions at the onset of a research programme on new horticultural crops, or when sourcing new plants from the wild.

The responses to questions 6.1 to 6.21 put to growers as well as consumers of ornamental plants and questions 8.1 to 8.47 put only to growers were intended to identify those selection issues applicable to such criteria.

Data on selection issues to be addressed in question 6 were also obtained through the study of related literature; refer in this instance to Section 3.7.1 to 3.7.4 and 3.8.

4.3.3 Sub-problem 2

Establishing whether growers and breeders of indigenous plants for horticultural use are responding adequately to meet new market opportunities caused by changing trends in the horticulture industry.

It is hypothesised that the extent of unexplored market possibilities is large enough to warrant the introduction of further indigenous plants and special purpose plants to the market, in addition to existing plant varieties.

The responses to questions 7.1 to 7.29 put to growers as well as consumers of ornamental plants, were intended to provide an indication of a lack of variety in indigenous plants in the market.

4.3.4 Sub-problem 3

Identifying the restraining factors inhibiting a more extensive use of indigenous South African flora in horticultural applications, such as, for instance, the competition they face from exotic plants.

It is hypothesised that the competition faced by indigenous South African flora in achieving a more widespread use in horticultural applications, together with other limitations, contributing to the underutilisation of such plants and, furthermore, that this postulated underutilisation is of sufficient magnitude to warrant a more comprehensive investigation.

The responses to questions 5 put to growers as well as consumers, and questions 9, 10 and 11 put to growers of ornamental plants were intended to provide confirmation of the factors limiting or posing competition to the use of indigenous South African flora as ornamental plants, as well as to identify underlying limitations and competition.

Data on selection issues to be addressed were also obtained through the study of related literature; refer in this instance to Section 3.3 to 3.5.

4.4 The data and their interpretation

The next step in the research is to deal with the interpretation of the data in order to resolve the research problem and its sub-problems. According to Leedy (1985:231), data as such is meaningless and the central meaning of the data has to be interpreted in order to resolve the research problem and its sub-problems.

The most important sets of data collected for this study were quantitative in nature. The analysis of these data sets called for the employment of statistical tools typically used in *descriptive statistics*, which is a discipline of quantitatively describing the main features of a collection of data. Analytical techniques, such as the calculation of the distribution of frequencies of values for a given variable, means and cross-tabulations, were used in order to reveal key statistical trends related to the core purpose of this study and which data the

survey questionnaire was designed to produce. In addition, the mean values of selected data constructs were compared across demographic variables using the *analysis of variance* (ANOVA) method (Field, 2009). The statistical computer packages used were SPSS Version 17.0 and SAS 9.1.

According to Ho (2006:238), the reliability of a statistical measuring instrument is defined as its ability to consistently measure the phenomenon it was designed to measure. Reliability, therefore, refers to the consistency of the results produced by a given testing method. The importance of the reliability of any given method of statistical inquiry is that it is a prerequisite for ensuring the validity of a test.

Put another way, the validity of using any particular statistical measuring instrument depends on whether it has been proven to be demonstrably reliable. The reliability of the data used for this study was evaluated by using the Cronbach's alpha as a coefficient of statistical reliability.

Ho (2006:240) describes the Cronbach's alpha as a single correlation coefficient that is an estimate of the average of all correlation coefficients scored by the items within a test. If the alpha coefficient is high (registering a value of 0.65 or higher), then this suggests that all of the items are reliable and that the entire test is internally consistent. The coefficient value of the Cronbach's alpha will generally increase as the inter-correlations among test items increase, and is thus known as an internal consistency estimate of reliability of test scores (http://en.wikipedia.org/wiki/Cronbach's_alpha, accessed 20-04-2012).

If Cronbach's alpha is low, then at least one of the items is unreliable, and must be identified via the procedure of *item analysis*. Ho (2006:240) describes the procedure of *item analysis* as a refinement of test reliability by identifying "problem" items in the test, i.e. those items that yield low correlations with the

sum of the scores pertaining to the other remaining items.

“Problem” items that yield low correlations in comparison to the scores of the remaining items, may suggest some degree of inconsistency, which could give grounds for rejecting them from the statistical analysis. Rejecting “problem” items and retaining those items with high average inter-correlations typically increase the internal consistency produced by the measuring instrument.

An *item analysis* was performed by means of the *item-total correlation test* in terms of which the tests or questions given to an individual (in this case, a respondent to the survey) were analysed to construct a useful single quantity for each individual that could be used to compare that individual with others in the target population. The *item-total correlation test* was used to see if any of the tests or questions ("items") did not vary in line with those for other tests administered across the target population. (http://en.wikipedia.org/wiki/Item-total_correlation, accessed 20-04-2012).

In cases where the Cronbach’s alpha detected inconsistencies, the scales were reversed. *Factor analysis* was then performed to try and find underlying latent variables which were then used for dimension reduction of the data. According to Ho (2006:203), the major aim of *factor analysis* is the orderly simplification of a large number of inter-correlated measures to a few representative constructs or factors. *Factor analysis* is based on the assumption that all variables are correlated to some degree. Therefore, those variables that share similar underlying dimensions should produce high levels of correlation with each other, and those variables that generate dissimilar dimensions should yield comparatively low levels of correlation. According to Ho (2006:203), these high/low correlation coefficients will become apparent in the correlation matrix, because they tend to form clusters indicating which variables “hang” together. The primary function of *factor analysis* is to identify those data clusters displaying high inter-correlations as independent factors. The three basic steps

of conducting *factor analysis* and used for purposes of this study are:

1. Computation of the correlation matrix for all variables.
2. Extraction of initial factors.
3. Rotation of the extracted factors to a terminal solution.

In the following section the data gathered from the survey responses are presented and interpreted and preliminary findings are discussed with the purpose to come to conclusions and recommendations in Chapter 5.

The questions from the survey are repeated hereafter (in *italics*) for easier reference, but this section should be read with the survey results given in Addenda D, E, F, G, H and I.

The questionnaire was divided into different sections and the sections A, B, C and D were the same for both categories; the ornamental plant growers (respondents directly involved with the growing of ornamental plants; either for production or research purposes) as well as for the garden centres, retail nurseries, landscape architects and landscape contractors (respondents dealing directly with the consumer or end-user of ornamental plants).

The sections included the following issues:

- Section A – Demographics: region of business and kind of operation (Refer to Addendum D).
- Section B – Consumer knowledge and attitude towards indigenous plants (Refer to Addendum E).
- Section C – Market demand and consumer selection criteria: consumer needs, plant attributes and horticultural performance (Refer to Addendum F).
- Section D – Industry trends and market possibilities: plant growth form, special purpose plants and edible plants (Refer to Addendum G).

The questionnaire for ornamental plant growers contained additional sections E and F addressing issues specific to operations involved in the growing and

production of plants. These additional sections included the following issues:

- Section E – Growers selection criteria: quality, production and handling, market and economic considerations, horticultural criteria (propagation methods, minimum period of good garden performance, maximum production time and crop turnover) and domestication of wild plants (Refer to Addendum H).
- Section F – Competition for and limitations to the utilisation of indigenous plants for horticultural purposes (Refer to Addendum I).

Question 1 was the questionnaire number to be completed by the researcher for each questionnaire received from a respondent. The use of a number for each respondent instead of his or her name, ensured anonymity of the participant.

Question 2 in both categories was intended to determine in which geographic region of the country each respondent is situated and Question 3 in both categories was intended to determine to which sub-grouping each respondent belongs.

4.4.1 Question 2 Section A Demographics (put to both categories)

Please indicate in which region your business is situated:

1. *Limpopo.*
2. *North-West Province.*
3. *Mpumalanga.*
4. *Gauteng North.*
5. *Gauteng South.*
6. *Free State.*
7. *Kwa-Zulu Natal.*
8. *Western Cape.*
9. *Eastern Cape.*

10. *Northern Cape.*

The purpose of this question was to:

- Determine the geographic region of the respondent.
- Indicate the climatic region and the vegetation type of the area where the respondent is situated.

4.4.2 Question 3 Section A Demographics (put to both categories)

Please indicate the kind of operation you are involved in:

The questionnaire for garden centres, retail nurseries, landscape architects and landscape contractors listed the following groups:

1. *Large life style garden centre.*
2. *Medium/small sized garden centre.*
3. *Specialist retail nursery.*
4. *Indigenous retail nursery.*
5. *Landscape/garden maintenance.*
6. *Landscape architect.*
7. *Landscape contractor.*

The questionnaire for ornamental plant growers listed the following groups:

1. *Large grower (mass production).*
2. *Medium/small sized grower.*
3. *Specialist grower.*
4. *Indigenous grower.*
5. *Research Institution.*
6. *Botanical Garden.*
7. *Large indigenous grower (mass production).*

The purpose of this question was to:

- Determine to which sub-grouping each respondent belong.
- Indicate specific needs for a group that could be highlighted during the analysis of responses.

Table 4.4.2.1 Demographics of the survey: The Region of business and kind of operation respondents were involved in.

REGION	Category 1 Growers		Total Ornamental plant growers	Category 2 Retailers and Landscapers		Total Retailers and Landscapers	Grand Total
	General and specialist other than indigenous	Indigenous and research institutions		Retailers	Landscapers		
Limpopo	1	0	1	3	4	7	8 (4.2%)
North West Province	2	3	5	3	0	3	8 (4.2%)
Mpumalanga	3	4	7	3	7	10	17 (8.9%)
Gauteng	21	13	34	14	44	58	92 (48.8%)
Free State	0	0	0	2	0	2	2 (1.1%)
Kwazulu Natal	2	4	6	3	10	13	19 (10%)
Western Cape	3	8	11	4	24	28	39 (20.5%)
Eastern Cape	1	0	1	1	2	3	4 (2.1%)
Northern Cape	0	0	0	0	1	1	1 (0.5%)
Total	33 (17.4%)	32 (16.8%)	65 (34.2%)	33 (17.4%)	92 (48.4%)	125 (65.8%)	190 (100%)

(One respondent did not indicate his/her region of operation, the grand total of participants in the survey was 191.)

4.4.3 Question 4 Section B Consumer knowledge and attitude towards indigenous plants (put to both categories)

Section B in both the survey categories was intended to determine consumer knowledge and attitude towards indigenous plants. This section contained two questions, Questions 4 and 5. Question 5 had 9 items.

From your experience, what percentages of your customers pertinently ask for indigenous plants?

The purpose of this question was to:

- Determine if consumers specifically ask for indigenous plants.
- Determine the percentage of customers currently using or intending to use indigenous plants.
- Determine the percentage of customers that have a positive attitude towards indigenous plants.
- Determine any future trends or tendencies in the use of indigenous plants by the parties involved in the horticultural use of indigenous plants, i.e. the ornamental plant growers, retailers, garden centers and the landscape industry.

From the whole industry (including *all* the participants in the survey), it can be seen that 49.77% respondents' customers pertinently asked for indigenous plants.

From the responses from all the sub-categories dealing directly with the *consumer* of ornamental plants, it can be seen that 47.07% of respondents' customers pertinently asked for indigenous plants.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 54.88% of respondents'

customers pertinently asked for indigenous plants.

From these percentages it can be deducted that practically 50% of respondents' customers were using indigenous plants or intended to use indigenous plants in the landscape or garden and had a positive attitude towards indigenous plants.

Comments from respondents

From garden centres:

- Customers do not necessarily ask for indigenous plants since it is indicated on the labels and signboards. But even so, many still ask.
- Most customers cannot distinguish between indigenous and exotic plants in a nursery.

The assumption made in Chapter 1 that a combination of exotic and indigenous plants is used in South Africa is therefore confirmed.

Recommendations made in Chapter 5 will therefore be mainly aimed at increasing the horticultural usage of indigenous plants in South Africa.

4.4.4 Question 5 Section B Consumer knowledge and attitude towards indigenous plants (put to both categories)

Please indicate to which extent you agree or disagree with each one of the following statements.

5.1 Customers are knowledgeable on the benefits of indigenous plants.

The purpose of this question was to:

- Determine consumer's knowledge and awareness of the benefits of indigenous plants (e.g. better survival during periods of drought, attracting

wild life, awareness and conservation of indigenous flora, general improvement of the environment) and subsequent utilisation thereof.

From the whole industry (including *all* the participants in the survey) it can be seen that 57.1% of respondents agreed that customers are knowledgeable about the benefits of indigenous plants, with the remainder of 42.9% who disagreed that customers are knowledgeable about the benefits of indigenous plants.

From the responses from all the sub-categories dealing directly with the *consumer* of indigenous plants, it can be seen that 54.8% of respondents agreed that customers are knowledgeable on the benefits of indigenous plants, and 45.2% of respondents' customers are ignorant about the benefits of indigenous plants.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 61.9% of respondents' customers are knowledgeable and 38.1% of customers are ignorant about the benefits of indigenous plants.

Furthermore it can be seen that the commercial or wholesale customer of growers (61.9% of landscapers and retailers), are more informed and knowledgeable on the benefits of indigenous plants than the end-user (54.8% of consumers) in South Africa.

Comments from respondents

From an indigenous grower:

- Most members of the public know very little about indigenous trees and plants.

From a specialist nursery:

- Many people ask for indigenous plants but don't really know what it means.

From garden centres:

- Customers are knowledgeable to a certain extent; the media promote the concept of planting indigenous and 'water wise' plants.
- Some are knowledgeable and really interested, approximately 10%, others want indigenous plants because it has become a 'buzz-word' and it is fashionable to plant indigenous.
- In up and coming ethnic groups that earn more money, the old well known exotics such as conifers are preferred and they are not interested in indigenous plants as such.

From landscape architects:

- Customers are knowledgeable on the benefits of indigenous plants, probably due to media and popular demand (fashion) and/or environmental awareness. However, they have no knowledge about the plants themselves such as which species to use or their growth requirements.
- Developers often specify that all plantings of a certain development such as a corporate park or residential security complex should be indigenous, but that is where it ends. They are not able to suggest any species.

5.2 Customers often ask for certain indigenous plants that may not be available in the trade yet.

The purpose of this question was to:

- Determine the availability of indigenous plants in the trade.
- Indicate if consumers are more educated and informed than the industry can supply for.

- Indicate whether retailers and/or growers should pay more attention to market demand.

From the whole industry (including *all* the participants in the survey), it can be seen that 53.7% of the respondents disagreed that customers often ask for certain indigenous plants that may not be available in the trade yet, and 42.9% agreed with this statement.

From the responses from all the sub-categories dealing directly with the *consumer* of indigenous plants, 65% of the respondents disagreed that customers often ask for certain indigenous plants that may not be available in the trade yet, and 35% agreed that customers often ask for certain indigenous plants that may not be available in the trade yet.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, 32.3% disagreed that customers often ask for certain indigenous plants that may not be available in the trade yet and 67.7% agreed that customers often ask for certain indigenous plants that may not be available in the trade yet.

Furthermore it can be seen that a much higher percentage (67.7%) of the commercial or wholesale customers of growers (landscapers and retailers), often ask for certain indigenous plants that may not be available in the trade yet, as opposed to end-users (35%).

Comments from respondents

From indigenous growers:

- Generally customers ask for the same well-known plants, but occasionally they ask for unusual species, which we try to provide. Species that are

difficult and which are often requested include species of *Faurea*, *Olinia*, *Parinari*, *Boscia*, *Euclea*, *Ximenia* and *Diospyros whyteana* and *D. mespiliformis* amongst others.

- Customers often see a certain indigenous plant being discussed in the media and ask for it. There is not always a correlation between what is published and what is available in the trade.

From a landscape contractor:

- The demands for indigenous plants are there, but it is not always available. Growers stick to easy and economic plants to grow, rather than trying to grow the more difficult ones.

From a plant broker:

- As plant brokers we feel the largest limiting factor on the availability of indigenous plants, is the lack of quantities available which could be as a result of an overwhelming need for indigenous plants and insufficient supply by the growers. This could be because:
 - There is limited propagation material (mother plants).
 - The grower's lack of knowledge as far as the demand for the material concerns.
 - Crop failures due to growers limited knowledge of the propagation and cultivation requirements of these plants.

5.3 There is a strong increase in the demand for indigenous plants.

The purpose of this question was to:

- Confirm or reject the growth in usage of indigenous plants in horticulture.

From the whole industry (including *all* the participants in the survey) it can be seen that 86.2% of the respondents agreed that there is a strong increase in the demand for indigenous plants, and 13.8% of the respondents disagreed with this

statement.

From the responses from all the sub-categories dealing directly with the *consumer* of ornamental plants, it can be seen that 87.1% of the respondents agreed that there is a strong increase in the demand for indigenous plants and 12.9% of the respondents disagreed that there is a strong increase in the demand for indigenous plants.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, 84.6% of the respondents agreed that there is a strong increase in the demand for indigenous plants, and 15.4% of the respondents disagreed that there is a strong increase in the demand for indigenous plants.

5.4 A customer relies on my expertise to suggest alternatives to exotic plants.

The purpose of this question was to:

- Confirm or reject the perception that customers rely heavily on the expertise of the industry to know and supply the correct indigenous species for specific situations.

From the whole industry (including *all* the participants in the survey), it can be seen that 94.2% of the respondents agreed that customers rely on their expertise to suggest alternatives to exotic plants, and 5.8% of the respondents disagreed that customers rely on their expertise to suggest alternatives to exotic plants.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 97.6% of respondents' customers relied on their expertise to suggest alternatives to exotic plants, and 2.4% of respondents' customers did not rely on their expertise to suggest alternatives to exotic plants.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 87.5% of customers did rely on the respondents' expertise to suggest alternatives to exotic plants and 12.3% of customers did not.

Comments from respondents

From a large grower (mass production):

- Customers don't ask for indigenous plants as such and assume those which we sell are the best products, non-invasive and legal to buy.

5.5 As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic.

The purpose of this question was to:

- Confirm or reject that the physical appearance of ornamental plants is more important to the consumer than the origin of the plant.
- Confirm or reject that an indigenous plant has to be attractive according to consumer preferences.

From the whole industry (including *all* the participants in the survey), 76.2% of the respondents agreed that as long as a plant is attractive, it does not matter to a customer whether a plant is indigenous or exotic, and 23.8% of the respondents disagreed with this statement.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 76.6% of respondents agreed that as long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic, and 23.4% of respondents disagreed.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 75.4% of respondents agreed that as long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic, and 24.6% of respondents disagreed.

5.6 Customers are more concerned about the performance of a plant than whether it is indigenous or exotic.

The purpose of this question was to:

- Confirm or reject whether a consumer's success with an ornamental plant is more important to the consumer than the origin of the plant.
- This will establish if indigenous plants also have to perform exceptionally well in the garden or landscape to be successful in the market.

From the whole industry (including all the participants in the survey) 80.6% of the respondents agreed that customers are more concerned about the performance of a plant than whether it is indigenous or exotic, and 19.4% of the respondents disagreed with this statement.

From the responses from all the sub-categories dealing directly with the *consumer* of indigenous plants, it can be seen that 84.7% of respondents agreed that customers are more concerned about the performance of a plant than whether it is indigenous or exotic, and 15.3% disagreed.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 72.6% of respondents agreed that customers are more concerned about the performance of a plant than whether it is indigenous or exotic, and 27.4% disagreed.

Comments from respondents

From an indigenous grower:

- Speed of growth and wild life attraction are important features of ornamental plants.

5.7 Customers often find the general appearance of indigenous plants 'untidy'.

The purpose of this question was to:

- Confirm or reject the perception that the general appearance of indigenous plants is 'untidy' and that it may be a limiting factor on the potential of the flora of South Africa as ornamental plants.

From the whole industry (including *all* the participants in the survey), it can be seen that 65.1% of respondents agreed that customers often find the general appearance of indigenous plants 'untidy', and 34.9% of the respondents disagreed with this statement.

From the responses from all the sub-categories dealing directly with the *consumer* it can be seen that 66.4% of respondents agreed that customers often find the general appearance of indigenous plants 'untidy', and 33.6% of the respondents disagreed.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 62.5% of respondents agreed that customers often find the general appearance of indigenous plants 'untidy', and 37.5% of respondents disagreed.

Comments from respondents

From a large grower (mass production):

- We strongly agree with this statement, especially bushveld plants. These

plants also often have a straggly wild unkempt growth habit, are thorny and unpleasant to work with or to have in personal environment, stinging hair, toxic milk or unpleasant smelling flowers or no flowers at all. However, some of the well-known indigenous garden shrubs such as *Tecomaria*, *Plumbago* and *Carissa* take very well to pruning and make excellent boxed-hedges, lollipops, topiary, labyrinths and other shaped forms.

From a landscape contractor (Western Cape):

- Customers often find the general appearance of indigenous plants 'untidy', especially fynbos plants.

From a garden centre (Gauteng North):

- Customers often find the general appearance of indigenous plants 'untidy', especially bushveld plants.

5.8 Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants.

The purpose of this question was to:

- Indicate whether there are certain exotic plants that are irreplaceable by indigenous plants.

From the whole industry (including *all* the participants in the survey) 71.7% of the respondents agreed, and 28.3% disagreed that customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 70.5% of respondents agreed that customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants, and 29.5% of respondents disagreed.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 74.2% of respondents agreed that customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants, and 25.8% of respondents disagreed.

Comments from respondents

From a garden center:

- The market demographics of Kwazulu Natal coastal area where customers are mostly Indian and African ethnic groups indicate that customers are not interested in indigenous plants, even disliking it. They want plants such as roses, peaches and petunias.

5.9 Customers have entrenched shopping habits and it is difficult for them to change to new products.

The purpose of this question was to:

- Confirm or reject the assumption that consumers are resistant to change.
- Determine the acceptance probability of new indigenous plants coming onto the market.

From the whole industry (including *all* the participants in the survey), 54.2% of the respondents disagreed, and 45.8% agreed that customers have entrenched shopping habits and it is difficult for them to change to new products.

From the responses from all the sub-categories dealing directly with the *consumer* it can be seen that 50.8% of respondents disagreed and 49.2% agreed that customers have entrenched shopping habits and it is difficult for them to change to new products.

From the responses from all the sub-categories directly involved with the

growing of ornamental plants, it can be seen that 61% of respondents disagreed and 39% of respondents agreed that customers have entrenched shopping habits and it is difficult for them to change to new products.

Comments from respondents

From a large grower (mass production):

- Customers want old well-known plants that are guaranteed successful, easy to grow and remind them of old familiar gardens and sentimental times.

From a garden centre:

- Only in certain lines e.g. bedding plants such as petunias, fruit trees, roses, palms and conifers. These are mostly benign exotics.

4.4.5 Reliability of the statistics contained in Section B: Consumer knowledge about and attitudes towards indigenous plants

The statistical analysis to determine the reliability (i.e. test for consistency) of the items in Question 5 indicated an internal inconsistency in the data produced by the responses to some of them compared to those of the other items. The reliability of the data was evaluated by calculating the Cronbach's alpha and it was discovered that Questions 5.2 and 5.4 contained elements, which were internally inconsistent and thus the data they produced were unreliable. The two relevant questions which produced the inconsistent data are quoted below for ease of reference:

1. *Question 5.2 Customers often ask for certain indigenous plants that may not be available in the trade yet; and*
2. *Question 5.4 A customer relies on my expertise to suggest alternatives to exotic plants.*

In those cases where the Cronbach's alpha indicated inconsistencies, the data

scales were reversed and *factor analysis* was performed to try and find underlying latent variables, which were used for dimension reduction of the data.

The sampling size of each of the three individual target sub-groups, comprising of 65 growers, 33 retailers and 92 landscapers, respectively, was too small to conduct a separate *factor analysis* on any single one of them, so no reliable results could be thus extracted. It was, however, possible to form a sample large enough to conduct a valid *factor analysis* by combining these three sub-groups together, making up a total sampling size of 191 respondents. With the omission of Questions 5.2 and 5.4 from the test, the subsequent *factor analysis* of the larger sample revealed three data clusters with high levels of inter-correlations as independent factors. The method used was *exploratory factor analysis* and *varimax rotation* was performed, which “forced” three factors (refer to Addendum E in this regard). In statistics, a varimax rotation is a change of coordinates used in principal component analysis and factor analysis that maximizes the sum of the variances of the squared loadings. Varimax rotation is often used in surveys to see how groupings of questions (items) measure the same concept. (<http://en.wikipedia.org/wiki/VARIMAX>, accessed 28-05-2012).

The following three data clusters were therefore identified:

1. Question 5.1: *Customers are knowledgeable on the benefits of indigenous plants* and Question 5.3: *There is a strong increase in the demand for indigenous plants.*
2. Question 5.5: *As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic* and Question 5.6: *Customers are more concerned about the performance of a plant than whether it is indigenous or exotic.*
3. Question 5.7: *Customers often find the general appearance of indigenous plants ‘untidy’,* Question 5.8: *Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants* and Question 5.9: *Customers have entrenched shopping habits*

and it is difficult for them to change to new products.

The three common factors or common denominators occurring in these three clusters were identified as:

Factor 1. Consumers' positive attitudes towards indigenous plants.

Factor 2. The fundamental or universally desirable ornamental plant attributes (i.e. attractiveness and good horticultural performance) that indigenous plants should exhibit in order to gain entry to the market and acceptance among consumers.

Factor 3. The underlying factors that may have a negative impact on the use of indigenous plants as ornamental plants (i.e. consumers' negative attitudes towards indigenous plants and the 'untidy' growth form of some indigenous plants).

The findings about these three factors are examined in Chapter 5.

4.4.6 Question 6 Section C Market demand and consumer selection criteria (put to both categories)

Question 6 was in a new section, Section C and was put to both categories. The objective of this section was to determine consumer demand and selection criteria important to the consumer. It contained one question divided in three sub-sections, namely consumer needs, plant attributes and horticultural performance.

From your experience, how important are the following considerations to your customer when he or she is making a purchase decision on plants?

The purpose of this question furthermore was to:

- Determine important consumer (wholesale consumer as well as end-user) needs for ornamental plants.
- Determine market trends for ornamental plants in the landscape industry.
- Determine market trends for ornamental plants in the retail or garden centre industry.
- Determine ornamental plant attributes important to consumers.
- Determine horticultural performance of ornamental plants important to the consumer.
- Apply the important consumer needs, plant attributes and horticultural performance expectations of consumers as selection criteria for the horticultural use of indigenous plants in South Africa.

Consumer needs:

6.1 Plants must be in fashion

From the experience of *all* the participants in the industry, for plants to be in fashion was important to 54.3% of respondents' customers, not important to 46.3%, and 1.6% of respondents didn't know if it was important to customers for plants to be in fashion.

From the responses from all the sub-categories dealing directly with the *consumer* it can be seen that it was important to 48.8% of respondents' customers, not important to 48.8%, and 2.4% of respondents didn't know if it was important to customers for plants to be in fashion.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 64.6%, and not important to 35.4% of respondents' customers for plants to be in fashion.

6.2 Plants must be non-poisonous

From the whole industry (including *all* the participants in the survey), it can be seen that it was important to 56.4% of respondents' customers that plants must be non-poisonous, not important to 41.9%, and 1.7% of respondents didn't know whether it was important to customers that plants must non-poisonous.

From the responses from all the sub-categories dealing directly with the *consumer* it can be seen that it was important to 55.8%, not important to 42.5%, and 1.7% of respondents didn't know if it was important to customers for plants to be non-poisonous.

From the responses from all the sub-categories dealing directly with the *growing* of ornamental plants, it can be seen that it was important to 57.6% of customers, not important to 40.7%, and 1.7% of respondents didn't know if it was important to customers for plants to be non-poisonous.

Comments from respondents

From indigenous growers and garden centres:

- Poisonous plants are only a problem where young children are in the vicinity.

This comment was made by two indigenous growers (both Mpumalanga) and one garden centre (Kwazulu Natal). The garden centre also mentioned that Indian households are especially negative to poisonous plants in the home environment where children are present.

6.3 Lifestyle complementing plants (e.g. small gardens, herbs, indoors)

From the whole industry (including *all* the participants in the survey), it can be seen that lifestyle complementing plants were important to 91.3% of the respondents' customers, not important to 6%, and 2.7% of respondents didn't

know whether it was important to customers that plants must be lifestyle complementing or not.

From the responses from all the sub-categories dealing directly with the *consumer*, lifestyle complementing plants were important to 90.2% of the respondents' customers, not important to 6.6%, and 3.3% of respondents didn't know if it was important to customers for plants to be lifestyle complementing.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it was important to 93.5% of respondents' customers, not important to 4.8%, and 1.6% of respondents didn't know if it was important to customers for plants to be lifestyle complementing.

Comments from respondents

From indigenous growers:

- Lifestyle complementing plants are only applicable in some cases.

From a garden center:

- Small gardens have become the norm, e.g. townhouses. Trees and plants with a small or compact growth form are popular. Indoor plants and plants for water features are in demand. An awareness of healthy lifestyle and interest in hobbies such as cooking resulted in an increase in the sales of herbs.

6.4 Low maintenance plants (no pruning, feeding, spraying)

From the whole industry (including *all* the participants in the survey), it can be seen that low maintenance plants were important to 97.3% of respondents' customers, not important to 2.1% and 0.5% of respondents didn't know whether it was important to customers for plants to be low maintenance.

From the responses from all the sub-categories dealing directly with the *consumer*, it was important to 98.4% and not important to 1.6% of respondents' customers for plants to be low maintenance.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it was important to 93.5%, not important to 4.8%, and 1.6% of respondents didn't know if it was important to customers for plants to be low maintenance.

6.5 Convenient (no messy fruit, leaves, roots)

From the industry (including *all* the participants in the survey), it can be seen that it was important to 91.4% of respondents' customers for plants to be convenient, not important to 7.5% and 1.1% of respondents didn't know whether it was important to customers that plants must be convenient.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 93.4%, not important to 5.7%, and 0.8% of respondents didn't know if it was important to customers for plants to be convenient.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 87.5% of respondents' customers for plants to be convenient, not important to 10.9%, and 1.6% of respondents didn't know if it was important to customers for plants to be convenient.

Comments from respondents

From a landscape contractor:

- Causing no inconvenience to a customer is important; the clogging of swimming pool filters by leaves, roots in pipes and lifting pavements and

cracking walls was of great concern to consumers, even more so if causing problems to the neighbour in high density living areas.

6.6 Customers want new plants (exciting, stimulating, fresh)

From the industry (including *all* the participants in the survey), it can be seen that new plants were important to 73.5% of respondents' customers, not important to 7.5%, and 1.1% of respondents didn't know whether new plants were important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 67.2%, not important to 30.3%, and 2.5% of respondents didn't know if it was important to customers for plants to be new.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 85.7% and not important to 14.3% of customers for plants to be new.

Comments from respondents

From a garden centre:

- New plants are very important and customers want new plants just as much as they want some of their old favourite plants.

From a specialist plant grower:

- The production and promotion of new (especially flower bearing herbaceous) plants is our core business; both indigenous and exotic. It is the reason for our existence; to provide the customer with something new and different.

6.7 Instant results are expected

From the industry (including *all* the participants in the survey), it can be seen that instant results were important to 85.6% of respondents' customers, not important to 13.9%, and 0.5% of respondents didn't know whether it was important for customers to have instant results.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 87%, not important to 12.2%, and 0.8% of respondents didn't know if it was important to customers to get instant results from plants.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 82.8% and not important to 17.2% respondents' customers to get instant results from plants.

Comments from respondents

From a landscape contractor:

- Instant results are important where landscape installation contracts are to be met.

6.8 Plant information (name, behaviour, how to care for it)

From the industry (including *all* the participants in the survey), it can be seen that plant information was important to 75.3% of respondents' customers, not important to 24.2%, and 0.5% of respondents didn't know whether plant information was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that plant information was important to 68.6%, not important to 30.6%, and 0.8% of respondents didn't know if plant information

was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 87.7% and not important to 12.3% of respondents' customers.

The survey results of the captured *Consumer needs* for ornamental plants are ranked below in descending order of importance

The importance ratings range between the values of 1 and 8, with 1 being the most important and 8 the least. The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. Low maintenance plants (no pruning, feeding, spraying) (97.3%).
2. Convenient (no messy fruit, leaves, roots) (91.4%).
3. Lifestyle complementing plants (e.g. small gardens, herbs, indoors) (91.3%).
4. Instant results are expected (85.6%).
5. Plant information (name, behaviour, how to care for it) (75.3%).
6. Customers want new plants (exciting, stimulating, fresh) (73.5%).
7. Plants must be non-poisonous (56.4%).
8. Plants must be in fashion (54.3%).

Plant attributes:

6.9 Neat appearance (bushiness, non-straggling, dense, compact)

From the industry (including *all* the participants in the survey), neat appearance of plants was important to 97.3% of respondents' customers, not important to 2.1%, and 0.5% of respondents didn't know whether a neat appearance was important to customers.

From the responses from all the sub-categories dealing directly with the

consumer it can be seen that it was important to 87.5%, not important to 9.2%, and 3.3% of respondents didn't know if neat appearance of plants was important to customers.

From the responses from all the sub-categories involved with the *growing* of ornamental plants, it can be seen that neat appearance of plants was important to 82.5% of respondents' customers, not important to 15.9%, and 1.6% of respondents didn't know if neat appearance of a plant was important to customers.

Comments from respondents

From an indigenous grower:

- Neat appearance of a plant may be important in town, but it is not important to customers on game farms.

6.10 Shape of plant (rounded, spreading)

From the industry (including *all* the participants in the survey), it can be seen that the shape of a plant was important to 76.9% of respondents' customers, not important to 20.4%, and 2.7% of respondents didn't know whether the shape of a plant was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer* of indigenous plants, it can be seen that it was important to 76.4%, not important to 21.1%, and 2.4% of respondents didn't know if the shape of a plant was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 77.8%, not important to 19.09%, and 3.2% of respondents didn't know if the shape of a plant was important to customers.

Comments from respondents

From an indigenous grower:

- The shape of a plant is important if for a particular situation.

6.11 Final size of plant (height and width)

From the industry (including *all* the participants in the survey), it can be seen that the size of a plant was important to 89.8% of respondents' customers, not important to 8.6%, and 2.1% of respondents didn't know whether final size of a plant was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer* it can be seen that it was important to 88.5%, not important to 8.2%, and 3.3% of respondents didn't know if the final size of a plant was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that the final size of a plant was important to 90.8% and not important to 9.2% of respondents' customers.

6.12 Colour of flowers

From the industry (including *all* the participants in the survey), it can be seen that flower colour was important to 81.3% of respondents' customers, not important to 17.6%, and 1.1% of respondents didn't know whether flower colour was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 84.6%, not important to 13.8%, and 1.6% of respondents didn't know if the colour of flowers was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that the colour of flowers was important to 75% and not important to 25% of customers.

6.13 Scent of flowers

From the industry (including *all* the participants in the survey), it can be seen that scent of flowers was important to 60.2% of respondents' customers, not important to 38.2%, and 1.6% of respondents didn't know whether scent of flowers was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 63.4%, not important to 35%, and 1.6% of respondents didn't know if the scent of flowers was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 54.0%, not important to 44.4%, and 1.6% of respondents didn't know if scent of flowers was important to customers.

Comments from respondents

From a garden centre:

- The scent of flowers is important and is one of the reasons why roses are so popular.

6.14 Size of flowers

From the industry (including *all* the participants in the survey), it can be seen that the size of flowers was important to 51.9% of respondents' customers, not important to 47.1%, and 1.1% of respondents didn't know whether size of flowers was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 48.8%, not important to 49.6%, and 1.6% of respondents didn't know if the size of flowers was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 56.3% and not important to 43.8% of respondents' customers.

Comments from respondents

From a specialist nursery and garden centre:

- The size of flowers is important and customers prefer large flowers. However, if the flowers are small, a good coverage of the plant and colourful display is also appreciated.

6.15 Plants attracting wildlife (birds, butterflies)

From the industry (including *all* the participants in the survey), plants attracting wildlife was important to 82.4% of respondents' customers, not important to 16%, and 1.6% of respondents didn't know whether plants attracting wildlife was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 82.1%, not important to 16.3%, and 1.6% of respondents didn't know if plants attracting wildlife was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 83.1%, not important to 15.4%, and 1.5% of respondents didn't know if plants attracting

wildlife was important to customers.

The survey results of the ornamental plant attributes important to the consumer are ranked below in descending order of importance

The importance ratings range between the values of 1 and 7, with 1 being the most important and 7 the least. The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. Neat appearance of a plant (bushiness, non-straggling, dense, compact) (97.3%).
2. Final size of plant (height and width) (89.8%).
3. Plants attracting wildlife (birds, butterflies) (82.4%).
4. Colour of flowers (81.3%).
5. Shape of plant (rounded, spreading) (76.9%).
6. Scent of flowers (60.2%).
7. Size of flowers (51.9%).

Horticultural performance:

6.16 Longevity of plant (last for minimum period)

From the industry (including *all* the participants in the survey), it can be seen that the longevity of a plant was important to 81.9% of the respondents' customers, not important to 17.6%, and 0.5% of respondents didn't know whether the longevity of a plant was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 83.9%, not important to 15.3%, and 0.8% of respondents didn't know if the longevity of a plant was important to customers.

From the responses from all the sub-categories directly involved with the

growing of ornamental plants, it can be seen that the longevity of a plant was important to 78.1% and not important to 21.9% of respondents' customers.

Comments from respondents

From an indigenous grower:

- Indigenous flora has a long lifetime thus a long term reward and also makes them economic.

From a garden centre:

- Plants dying shortly after planting is a disappointment, but there might be other reasons than the plant as such (e.g. soil types).

6.17 Quality of the plant (total appearance, health, attractiveness)

From the industry (including *all* the participants in the survey), it can be seen that the quality of a plant was important to 94.7% of respondents' customers, not important to 4.81%, and 0.5% of respondents didn't know whether the quality of a plant was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, the quality of a plant was important to 92.7%, not important to 6.5%, and 0.8% of respondents didn't know if the quality of a plant was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that the quality of a plant was important to 98.5% and not important to 1.5% of respondents' customers.

6.18 Plants must conform to "water wise" practice

From the industry (including *all* the participants in the survey), it can be seen

that 'water wise' plants were important to 76.4% of respondents' customers, not important to 22.2%, and 0.5% of respondents didn't know whether 'water wise' plants were important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 80.6%, not important to 18.5%, and 0.8% of respondents didn't know if plants that conform to 'water wise' practice was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that plants that conform to 'water wise' practice was important to 70.8% and not important to 29.2% of respondents' customers.

6.19 Suitability of plant for climate

From the industry (including *all* the participants in the survey), it can be seen that suitability of the plant for the climate was important to 85.1% of respondents' customers, not important to 14.4%, and 0.5% of respondents didn't know whether it was important to customers that plants must be suitable for the climate.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 84.7%, not important to 14.5%, and 0.8% of respondents didn't know if the suitability of a plant for the climate was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 85.9% and not important to 14.1% of respondents' customers that the plant was suitable for the climate.

6.20 Good garden performance (flowers, leaves)

From the industry (including *all* the participants in the survey), it can be seen that good garden performance was important to 94.7% of respondents' customers, not important to 4.3%, and 1.1 % of respondents didn't know whether good garden performance it was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 94.4%, not important to 4%, and 1.6% of respondents didn't know if good garden performance was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 95.3% and not important to 4.7% of respondents' customers.

6.21 Good resistance to pests and diseases

From the industry (including *all* the participants in the survey), good resistance to pests and diseases was important to 75.5% of respondents' customers, not important to 23.9%, and 0.5% of respondents didn't know whether good resistance to pests and diseases was important to customers.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that it was important to 74%, not important to 25.2%, and 0.8% of respondents didn't know if a good resistance to pests and diseases was important to customers.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that it was important to 78.5% and not important to 21.5% of respondents' customers.

The survey results of the horticultural performance aspects important to the consumer are ranked below in descending order of importance

The importance ratings range between the values of 1 and 5, with 1 being the most important and 5 the least. The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. Both quality of the plant (total appearance, health, attractiveness) and good garden performance (flowers, leaves) were rated as the most and equally important (94.7%).
2. Suitability of plant for climate (85.1%).
3. Longevity of plant (last for minimum period) (81.9%).
4. Plants must conform to “water wise” practice (76.4%).
5. Good resistance to pests and diseases (75.5%)

4.4.7 Summary of the survey results on market demand and consumers’ selection criteria

When the survey results across the questionnaire categories of consumer needs, plant attributes and horticultural performance are integrated and summarised, the following tendencies can be observed:

4.4.7.1 The most important set of consumer needs in respect of ornamental plants

Below appears the most important set of consumer needs captured by the survey. These needs translate into the most appropriate criteria for the horticultural use of indigenous plants in South Africa. Survey participants accorded importance ratings to these needs/criteria in the order of between 90% and 100%. The itemised listing below is not in any order of importance.

- The overall appearance is the single most important feature of

an ornamental plant. Indigenous plants should therefore be attractive, have a neat look and growth form, appear to be healthy, and convey an overall image of a high quality product.

- Low maintenance plants are highly desirable. These plants require little or no pruning, spraying and watering, nor do they produce messy fruit, leaves or invasive roots.
- Good garden performance in terms of leaf covering and/or flower production over a reasonable period of time. Performance will vary according to plant type.
- Lifestyle complementing plants (e.g. for small gardens, indoors, herbs) are very important in the ornamental plant market today and indigenous plants should be matched with specific types of lifestyles.
- The final size of the plant is important when considering its intended purpose and location (height and width) and this information should always be supplied to the consumer.

4.4.7.2 The second most important set of consumer needs in respect of ornamental plants

Below appears the second most important set of consumer needs captured by the survey, which are of great importance in promoting the use indigenous plants for ornamentation. Survey participants accorded importance ratings to these needs/criteria in the order of between 80% and 89%. The itemised listing below is not in any order of importance.

- The immediate environment enhancing effect (instant results) expected from garden and landscape plants.
- The plants' suitability for a given climate.
- The plants' ability to attract wildlife, such as birds and butterflies.

- Plants must have a reasonable lifetime or last for minimum period.
- The colour of the plants' flowers.

4.4.7.3 The third most important set of consumer needs in respect of ornamental plants

Below appears the third most important set of consumer needs captured by the survey which are of great importance in promoting the use indigenous plants for ornamentation. Survey participants accorded importance ratings to these needs/criteria in the order of between 60 % and 79%. The itemised listing below is not in any order of importance.

- Plants must permit “water wise” practices.
- The shape of the plant (e.g. rounded, spreading).
- Resistance to major pests and diseases.
- Plant information (e.g. name, behaviour, how to care for it) must be supplied.
- Customers' desire for new plant varieties which they find exciting, stimulating.
- The pleasant aroma of leaves and scent of flowers.

4.4.7.4 The least important set of consumer needs in respect of ornamental plants

Below appears the set of consumer needs captured by the survey which respondents considered to be of lesser importance than the preceding three sets, yet significant enough to be used as criteria in the selection of indigenous plants. Survey participants accorded importance ratings to these needs/criteria in the order of between 50%

and 59%. The itemised listing below is not in any order of importance.

- Plants must be non-poisonous.
- Plants must be in fashion.
- The size of flowers.

4.4.8 Question 7 Section D Industry trends and market possibilities (put to both categories)

This section of the questionnaire was put to both categories with the objective of identifying in which groups there was a lack of variety in indigenous plants in the market and to foresee industry trends and suggest market possibilities for indigenous plants. This section had one question divided into three sub-sections namely growth form, special purpose plants and edible plants. The question had 29 items.

To what extent do you experience a lack of variety in indigenous plants in the following groups?

The purpose of this question was to:

- Determine in which horticultural groups there is a shortage in the supply of indigenous plants. This will indicate where emphasis for new introductions should be.
- Determine in which horticultural groups the supply of indigenous plants is sufficient.
- Determine the market possibilities for indigenous plants and in which groups to select and source wild plants to fulfil market needs.
- In the case of growers' responses, it may also indicate a limitation in the flora to contribute to certain horticultural groups.

Growth form:

7.1 Annuals (flowering seedlings)

From the industry (including *all* the participants in the survey) it can be seen that 66.1% of respondents often or very often experienced a lack of variety in indigenous annuals in the market, 22.4% never or rarely did, and 11.5% of respondents didn't know whether there was a lack of variety in indigenous annuals in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 64.5% often or very often did, 25.8% never or rarely, and 9.7% of respondents didn't know if there was a lack of variety in indigenous annuals in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 69.5% of respondents often or very often did, 15.3% never or rarely did, and 15.3% of respondents didn't know if there was a lack of variety in indigenous annuals in the market.

Comments from respondents

From a garden centre:

- We very often experience a lack of variety in indigenous annuals. The old well-known indigenous plants such as *Lobelia* and *Gazania* are mostly available, with a few recently introduced new cultivars of *Nemesia*.

7.2 Herbaceous perennials

From the industry (including *all* the participants in the survey), 49.5% of the respondents often or very often experienced a lack of variety in indigenous herbaceous perennials in the market, 42.4% never or rarely did, and 8.25% of respondents didn't know whether there was a lack of variety in herbaceous

perennials in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 48% often or very often did, 48% never or rarely did, and 4.1% of respondents didn't know if there was a lack of variety in indigenous herbaceous perennials in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 52.5% often or very often did, 31.1% never or rarely did, and 16.4% of respondents didn't know if there was a lack of variety in indigenous herbaceous perennials in the market.

Comments from respondents

From a garden centre:

- We very often experience a lack of variety in indigenous herbaceous perennials, which are also important colour providing plants. New *Pentas* cultivars and species such as *Gomphostigma*, *Osteospermum* and *Euryops* are becoming available now.

7.3 Trees

From the industry (including *all* the participants in the survey), it can be seen that 70.61% of respondents never or rarely experienced a lack of variety in indigenous trees in the market, 25.7% of respondents often or very often did, and 3.7% of respondents didn't know whether there was a lack of variety in indigenous trees in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 74.2% of respondents never or rarely did, 23.4% often or very often did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous trees in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 63.5% of respondents never or rarely did, 30.2% often or very often did, and 6.3% of respondents didn't know if there was a lack of variety in indigenous trees in the market.

Comments from respondents

From a large grower (mass production):

- There is a lack of variety in indigenous trees for cold areas.

From a garden centre:

- We rarely experience a lack of variety in indigenous trees, it is well provided and there are also many new species available.

7.4 Succulents

From the industry (including *all* the participants in the survey), it can be seen that 58.4% of respondents never or rarely experienced a lack of indigenous succulents in the market, 36.2% of respondents often or very often did, and 5.4% of respondents didn't know whether there was a lack of variety in indigenous succulents in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 65.3% of respondents never or rarely experienced a lack of variety in indigenous succulents in the market, 32.3% often or very often did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous succulents in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 44.3% often or very often did, 44.3% never or rarely did, and 11.3% of respondents didn't know if there was a

lack of variety in indigenous succulents in the market.

Comments from respondents

From a large grower (mass production):

- There is a lack of variety in indigenous succulents for cold areas.

From a garden center:

- We rarely experience a lack of variety in succulents. Popular species such as *Aloe* are now available in new cultivars, mainly supplied by specialist nurseries.

7.5 Aquatic plants (e.g. water lilies)

From the industry (including *all* the participants in the survey), it can be seen that 55.9% of respondents often or very often experienced a lack of indigenous aquatic plants in the market, 35.5% never or rarely did, and 8.6% of respondents didn't know whether there was a lack of variety in indigenous aquatic plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 57.3% often or very often did, 37.9% never or rarely did, and 4.8% of respondents didn't know if there was a lack of variety in indigenous aquatic plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 53.2% often or very often did, 30.6% never or rarely did, and 16.1% of respondents didn't know if there was a lack of variety in indigenous aquatic plants in the market.

Comments from respondents

From a garden center:

- We often experience a lack of aquatic plants since water features have become popular additions to homes and gardens and customers ask for suitable plants for these water gardens.

7.6 Bulbs

From the industry (including *all* the participants in the survey), it can be seen that 59% of respondents never or rarely experienced a lack of variety in indigenous bulbs 31.2% of respondents often or very often did, and 9.8% of respondents didn't know whether there was a lack of variety in indigenous bulbs in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 62.3% of respondents never or rarely experienced a lack of variety in indigenous bulbs in the market, 31.5% often or very often did, and 6.6% of respondents didn't know if there was a lack of variety in indigenous bulbs in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 52.5% never or rarely experienced a lack of variety in indigenous bulbs in the market, 31.1% often or very often did, and 16.4% of respondents didn't know if there was a lack of variety in indigenous bulbs in the market.

7.7 Curiosity plants (e.g. unusual shapes)

From the industry (including *all* the participants in the survey), it can be seen that 52.2% of respondents often or very often experienced a lack of variety in indigenous curiosity plants in the market, 38.8% never or rarely did, and 9.3% of respondents didn't know whether there was a lack of variety in indigenous

curiosity plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 54.9% of respondents often or very often experienced a lack of variety in indigenous curiosity plants in the market, 36.1% never or rarely did, and 9% of respondents didn't know if there was a lack of variety in indigenous curiosity plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 46.7% of respondents often or very often experienced a lack of variety in indigenous curiosity plants in the market, 43.3% never or rarely did, and 10% of respondents didn't know if there was a lack of variety in indigenous curiosity plants in the market.

7.8 Cape flora (proteas, pin cushions)

From the industry (including *all* the participants in the survey), it can be seen that 48.9% of respondents never or rarely experienced a lack of variety in Cape flora in the market, 38% often or very often did, and 13% of respondents didn't know whether there was a lack of variety in Cape flora in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 49.2% of respondents never or rarely experienced a lack of variety in Cape flora in the market, 37.9% often or very often did, and 12.9% of respondents didn't know if there was a lack of variety in Cape flora in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 48.3% of respondents never or rarely experienced a lack of variety in Cape flora in the market, 38.3% often or very often did, and 13.3% of respondents didn't know if there was a lack of variety in Cape flora in the market.

Comments from respondents

From a Botanical Garden:

- Cape flora is very habitat specific and needs specialised growing conditions.

From a large grower:

- Cape flora is area bound.

From a garden center (Gauteng North):

- We often experience that Cape flora is asked for by customers although we are out of the Cape region. They want to experience and enjoy it in their own gardens just like other favourite exotic plants and did not understand or care about the concept of biomes or flora. The demand may also be due to national pride. Fortunately of late there are new cultivars coming onto the market which are more suitable for cultivation in this part of the country.

From an indigenous grower:

- We often experience a lack of variety in Cape flora in the summer rainfall area.

7.9 Shrubs

From the industry (including *all* the participants in the survey), it can be seen that 58.3% of respondents never or rarely experienced a lack of variety in indigenous shrubs in the market, 38% often or very often did, and 3.7% of respondents didn't know whether there was a lack of variety in indigenous shrubs in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 62.1% of respondents never or rarely experienced

a lack of variety in indigenous shrubs in the market, 35.5% often or very often did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous shrubs in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 50.8% of respondents never or rarely experienced a lack of variety in indigenous shrubs in the market, 42.9% often or very often did, and 6.3% of respondents didn't know if there was a lack of variety in indigenous shrubs in the market.

7.10 Climbers

From the industry (including *all* the participants in the survey), it can be seen that 59.8% of respondents often or very often experienced a lack of variety in indigenous climbers in the market, 34.8% never or rarely did, and 5.4% of respondents didn't know whether there was a lack of variety in indigenous climbers in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 59.7% of respondents often or very often experienced a lack of variety in indigenous climbers in the market, 36.3% never or rarely did, and 4.0% of respondents didn't know if there was a lack of variety in indigenous climbers in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 60% of respondents often or very often experienced a lack of variety in indigenous climbers in the market, 31.7% never or rarely did, and 8.3% of respondents didn't know if there was a lack of variety in indigenous climbers in the market.

7.11 Grass and grass-like plants

From the industry (including *all* the participants in the survey), it can be seen that

54.6% of respondents often or very often experienced a lack of variety in indigenous grasses and grass-like plants in the market, 42.2% never or rarely did, and 3.2% of respondents didn't know whether there was a lack of variety in indigenous grasses and grass-like plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 52% of respondents often or very often experienced a lack of variety in indigenous grasses and grass-like plants in the market 46.3%, never or rarely did, and 1.6% of respondents didn't know if there was a lack of variety in indigenous grasses and grass-like plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 59.7% of respondents often or very often experienced a lack of variety in indigenous grasses and grass-like plants in the market, 33.9% never or rarely did, and 6.5% of respondents didn't know if there was a lack of variety in indigenous grasses and grass-like plants in the market.

7.12 Groundcovers

From the industry (including *all* the participants in the survey), it can be seen that 60% of respondents never or rarely experienced a lack of variety in indigenous groundcovers in the market, 35.7% often or very often did, and 4.3% of respondents didn't know whether there was a lack of variety in indigenous groundcovers in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 66.1% of respondents never or rarely experienced a lack of variety in indigenous groundcovers in the market, 31.5% often or very often did, and 2.5% of respondents didn't know if there was a lack of variety in indigenous groundcovers in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 47.5% never or rarely experienced a lack of variety in indigenous groundcovers in the market, 44.3% often or very often did, and 8.2% of respondents didn't know if there was a lack of variety in indigenous groundcovers in the market.

7.13 Ferns and foliage plants

From the industry (including *all* the participants in the survey), it can be seen that 55.7% of respondents often or very often experienced a lack of variety in indigenous ferns and foliage plants in the market, 36.1% never or rarely did, and 8.2% of respondents didn't know whether there was a lack of variety in indigenous ferns and foliage plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 53.7% of respondents often or very often experienced a lack of variety in indigenous ferns and foliage plants in the market, 41.3% never or rarely did, and 5% of respondents didn't know if there was a lack of variety in indigenous ferns and foliage plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 59.7% of respondents often or very often experienced a lack of variety in indigenous ferns and foliage plants in the market, 25.8% never or rarely did, and 14.5% of respondents didn't know if there was a lack of variety in indigenous ferns and foliage plants in the market.

General comments on this section (growth form)

From a landscape designer/contractor with offices in the Western Cape and Gauteng North:

- *I never experience a lack of variety in indigenous plants on the market, except for annuals and collectibles. In the Johannesburg area we have a*

bigger variety of nurseries to source plants from.

The degrees to which consumers experience a lack of variety in growth forms of indigenous plants in the market is ranked below in descending order of importance

The deficiency ratings range between the values of 1 and 12, with 1 being the most serious and 12 the least. The percentage of respondents concurring with each of the ratings appears in brackets.

1. Annuals (66.1% of respondents often or very often experienced a lack of variety in indigenous annuals).
2. Climbers (59.8% of respondents often or very often experienced a lack of variety in indigenous climbers).
3. Aquatic plants (55.9% of respondents often or very often experienced a lack of variety in indigenous aquatic plants).
4. Ferns and foliage plants (55.7% of respondents often or very often experienced a lack of variety in indigenous ferns and foliage plants).
5. Grasses and grass-like plants (54.6% of respondents often or very often experienced a lack of variety in indigenous grasses and grass-like plants).
6. Curiosity plants (52.2% of respondents often or very often experienced a lack of variety in indigenous curiosity plants).
7. Herbaceous perennials (49.5% of respondents often or very often experienced a lack of variety in indigenous herbaceous perennials).
8. Cape flora and indigenous shrubs (38% of respondents often or very often experienced a lack of variety in both indigenous shrubs and Cape flora).
9. Succulents (36.2% of respondents often or very often experienced a lack of variety in indigenous succulents).
10. Groundcovers (35.7% of respondents often or very often experienced a lack of variety in indigenous groundcovers).

11. Bulbs (31.2% of respondents often or very often experienced a lack of variety in indigenous bulbs).
12. Trees (25.7% of respondents often or very often experienced a lack of variety in indigenous trees).

Special purpose plants:

7.14 Fillers (large beds and quantities)

From the industry (including *all* the participants in the survey), it can be seen that 54.1% of respondents never or rarely experienced a lack of variety in indigenous fillers in the market, 39.2% often or very often did, and 6.6% of respondents didn't know whether there was a lack of variety in indigenous fillers in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 56.9% of respondents never or rarely experienced a lack of variety in indigenous fillers in the market, 39% often or very often did, and 4.1% of respondents didn't know if there was a lack of variety in indigenous fillers in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 48.3% of respondents never or rarely experienced a lack of variety in indigenous fillers in the market, 39.7% often or very often did, and 12.1% of respondents didn't know if there was a lack of variety in indigenous fillers in the market.

Comments from respondents

From a landscape contractor:

- Although the market is well supplied in indigenous fillers, it is always just the same boring plant choices e.g. *Tulbaghia*, *Bulbine*, *Dietes*,

Agapanthus and *Gazania*, there is definitively not enough variety in this group.

From a large grower:

- We rarely experience a lack of variety in indigenous fillers and the market is well supplied by dependable relatively cheap plants. Several new cultivars of *Agapanthus* started to come onto the market during the past few years, and there are probably more to come from the breeders.

7.15 Colour providing plants

From the industry (including *all* the participants in the survey), it can be seen that 61.7% of respondents often or very often experienced a lack of variety in indigenous colour providing plants, 35.5% never or rarely did, and 2.7% of respondents didn't know whether there was a lack of variety in indigenous colour providing plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 62.3% of respondents often or very often experienced a lack of variety in indigenous colour providing plants, 36.1% never or rarely did, and 1.6% of respondents didn't know if there was a lack of variety in indigenous colour providing plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 60.7% of respondents often or very often experienced a lack of variety in indigenous colour providing plants, 34.4% never or rarely did, and 4.9% of respondents didn't know if there was a lack of variety in indigenous colour providing plants in the market.

Comments from respondents

From a large grower:

- There is a lack of variety in indigenous colour providing plants for cold areas.

From a garden centre:

- Colour providing plants are important in the consumer market and colour is provided mostly by annuals, herbaceous perennials such as *Pelargonium* with many new cultivars; and plants with colourful foliage, hence the commercial success of the exotic *Duranta* 'Sheenas Gold'.

From an indigenous grower:

- *Most ordinary folk see indigenous plants as a lot of green stuff without any colour and they just don't buy them.*

7.16 Accent plants (e.g. tree aloes)

From the industry (including *all* the participants in the survey), it can be seen that 54.8% of respondents never or rarely experienced a lack of variety in indigenous accent plants in the market, 40.9% often or very often did, and 4.3% of respondents didn't know whether there was a lack of variety in indigenous accents plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 54% of respondents never or rarely experienced a lack of variety in indigenous accent plants in the market, 43.5% often or very often did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous accent plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 56.5% never or rarely experienced a lack of variety in indigenous accent plants in the market, 35.5%

often or very often did, and 8.1% of respondents didn't know if there was a lack of variety in indigenous accent plants in the market.

Comments from respondents

From a large grower

- There is a lack of variety in indigenous accent plants for cold areas.

7.17 Shade plants

From the industry (including *all* the participants in the survey), it can be seen that 58.8% of respondents often or very often experienced a lack of variety in indigenous shade plants in the market, 37.4% never or rarely did, and 3.8% of respondents didn't know whether there was a lack of variety in indigenous shade plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 64.5% of respondents often or very often experienced a lack of variety in indigenous shade plants in the market, 33.1% never or rarely did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous shade plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 46.6% often or very often of respondents often or very often experienced a lack of variety in indigenous shade plants in the market, 46.6% never or rarely did, and 6.9% of respondents didn't know if there was a lack of variety in indigenous shade plants in the market.

7.18 Collectibles (e.g. cycads)

From the industry (including *all* the participants in the survey), it can be seen that 47.8% of respondents often or very often experienced a lack of variety in

indigenous collectibles in the market, 43.5% never or rarely did, and 8.7% of respondents didn't know whether there was a lack of variety in indigenous collectibles in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 53.3% of respondents often or very often experienced a lack of variety in indigenous collectibles in the market, 38.5% never or rarely did, and 8.2% of respondents didn't know if there was a lack of variety in indigenous collectibles in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 53.2% of respondents never or rarely experienced a lack of variety in indigenous collectibles in the market, 37.1% often or very often did, and 9.7% of respondents didn't know if there was a lack of variety in indigenous collectibles in the market.

Comments from respondents

From a garden center:

- The garden centre customer is not really a collector, and is happy with *Cycas* species or one of the cheaper more common *Encephalartos* species. There is a growing interest however in succulents and curiosity plants for outside gardens as well as pot plants of different sizes, especially small pots for indoors and fashionable patio pots.

7.19 Outdoor container plants (patio)

From the industry (including *all* the participants in the survey), it can be seen that 46.2% of respondents often or very often experienced a lack of variety in indigenous outdoor container plants in the market, 45.1% never or rarely did, and 8.8% of respondents didn't know whether there was a lack of variety in indigenous outdoor container plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 48.4% of respondents often or very often experienced a lack of variety in indigenous outdoor container plants in the market, 43.5% never or rarely did, and 8.1% of respondents didn't know if there was a lack of variety in indigenous outdoor container plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 48.3% of respondents never or rarely experienced a lack of variety in indigenous outdoor container plants in the market, 41.4% often or very often did, and 10.3% of respondents didn't know if there was a lack of variety in indigenous outdoor container plants in the market.

7.20 Indoor plants

From the industry (including *all* the participants in the survey), it can be seen that 72.1% of respondents often or very often experienced a lack of variety in indigenous indoor plants in the market, 16.2% never or rarely did, and 11.7% of respondents didn't know whether there was a lack of variety in indoor plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 71.9% % of respondents often or very often experienced a lack of variety in indigenous indoor plants in the market, 16.5% never or rarely did and 11.7% of respondents didn't know if there was a lack of variety in indigenous indoor plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 72.4% % of respondents often or very often experienced a lack of variety in indigenous indoor plants in the market, 15.5% never or rarely did, and 12.1% of respondents didn't know if there was a lack of variety in indigenous indoor plants in the market.

Comments from respondents

From a garden centre:

- The indoor plant market is dominated by well-known exotic plants. Nowadays many cultivars of pot *Gerbera* prove to be very successful in the market. However, it is more for the gift market and impulse buying than for the greening of interior spaces.

From a landscape contractor:

- There is a shortage in indigenous plants for large indoor areas e.g. office blocks, shopping malls and hotels.

7.21 Drought resistant plants

From the industry (including *all* the participants in the survey), it can be seen that 68.3% of respondents never or rarely experienced a lack of variety in indigenous drought resistant plants in the market, 28.4% often or very often did, and 3.3% of respondents didn't know whether there was a lack of variety in indigenous drought resistant plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 69.1% of respondents never or rarely experienced a lack of variety in indigenous drought resistant plants in the market, 28.5% often or very often did, and 2.4% of respondents didn't know if there was a lack of variety in indigenous drought resistant plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 66.7% of respondents never or rarely experienced a lack of variety in indigenous drought resistant plants in the market, 28.3% often or very often did, and 5% of respondents didn't know if there was a lack of variety in indigenous drought resistant plants in the market.

7.22 Erosion control, soil stabilisation

From the industry (including *all* the participants in the survey), it can be seen that 49.7% of respondents never or rarely experienced a lack of variety in indigenous erosion control and soil stabilisation plants in the market, 35.9% of respondents often or very often did, and 14.4% of respondents didn't know whether there was a lack of variety in indigenous erosion control plants and soil stabilisation plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 45.1% of respondents never or rarely experienced a lack of variety in indigenous erosion control and soil stabilisation plants in the market, 42.6% often or very often did, and 12.3% of respondents didn't know if there was a lack of variety in indigenous erosion control and soil stabilisation plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 59.3% of respondents never or rarely experienced a lack of variety in indigenous erosion control and soil stabilisation plants in the market, 22% often or very often did, and 18.6% of respondents didn't know if there was a lack of variety in indigenous erosion control and soil stabilisation plants in the market.

7.23 Hedges (screening and security)

From the industry (including *all* the participants in the survey), it can be seen that 51.4% of respondents never or rarely experienced a lack of variety in indigenous hedge plants in the market, 39.8% often or very often did, and 8.8% of respondents didn't know whether there was a lack of variety in indigenous hedge plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 52% of respondents never or rarely experienced a

lack of variety in indigenous hedge plants in the market, 41.5% often or very often did, and 6.5% of respondents didn't know if there was a lack of variety in indigenous hedge plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 50% of respondents never or rarely experienced a lack of variety in indigenous hedge plants in the market, 36.2% often or very often did, and 13.8% of respondents didn't know if there was a lack of variety in indigenous hedge plants in the market.

Comments from respondents

From a large grower:

- There is a lack of variety in indigenous plants for hedges in cold areas.

From a garden center:

- We often experience a shortage in plants for hedges as the security situation has become of great concern to all population groups. Privacy is also becoming more important, and plants are more attractive than concrete walls, and also have other benefits. However, some of the plants suggested by indigenous growers e.g. *Maytenus* species are foul smelling when in flower.

7.24 Replacements for invasive plants

From the industry (including *all* the participants in the survey), it can be seen that 56.9% of respondents never or rarely experienced a lack of variety in indigenous replacements for invasive plants in the market, 37% often or very often did, and 6.1% of respondents didn't know whether there was a lack of variety in indigenous replacements for invasive plants in the market.

From the responses from all the sub-categories dealing directly with the

consumer, it can be seen that 59.8% of respondents never or rarely experienced a lack of variety in indigenous replacements for invasive plants in the market, 34.4% often or very often did, and 5.7% of respondents didn't know if there was a lack of variety in indigenous replacements for invasive plants in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 50.8% of respondents never or rarely experienced a lack of variety in indigenous replacements for invasive plants in the market, 42.4% often or very often did, and 6.8% of respondents didn't know if there was a lack of variety in indigenous replacements for invasive plants in the market.

Comments from respondents

From a large grower:

- There is a lack of variety in indigenous replacements for invasive plants in cold areas.

7.25 Cold hardy plants

From the industry (including *all* the participants in the survey), it can be seen that 54.9% of respondents often or very often experienced a lack of variety in indigenous cold hardy plants in the market, 33% never or rarely did, and 12.1% of respondents didn't know whether there was a lack of variety in indigenous cold hardy plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 48% of respondents often or very often experienced a lack of variety in indigenous cold hardy plants in the market, 36.6% never or rarely did, and 15.4% of respondents didn't know if there was a lack of variety in indigenous cold hardy plants in the market.

From the responses from all the sub-categories directly involved with the

growing of ornamental plants, it can be seen that 69.5% of respondents often or very often experienced a lack of variety in indigenous cold hardy plants in the market, 25.4% never or rarely did, and 5.1% of respondents didn't know if there was a lack of variety in indigenous cold hardy plants in the market.

Comments from respondents

From a large grower:

- The only and largest factor that limits the use of indigenous plants is the climate. Low temperatures (frost between 0° and -10° Celsius) limit the use of our most attractive indigenous plants. The Highveld, Freestate and cold Karoo areas make it difficult to grow only indigenous plants. We experience a shortage of indigenous plants in several growth forms as well as for several purposes.

From an indigenous grower:

- We are trying to expand our availability list of trees for cold areas and thornveld of Weenen and Estcourt areas of the country.

Comments from respondents on special purpose plants

From a landscape architect (offices in Gauteng North, Western Cape and Northern Cape):

- There is also a lack of variety in other special purpose plants such as upright plants in shade and/or badly drained soil. Indigenous plants are also needed for different soil types, wind tolerance, western summer sun and no winter sun. Plants to match the scale of modern buildings are needed e.g. narrow plants for narrow spaces. Consumers also have different needs and private clients and developers often specify the preference for indigenous plantings, but have no knowledge of indigenous plants as such.

The degrees to which consumers experience a lack of variety of indigenous special purpose plants in the market is ranked below in descending order of importance

From the responses from *all* the participants of the industry, the biggest lack of variety was expressed as number 1, and the smallest lack of variety as number 12; the results were as follows:

1. Indoor plants (72.1% of respondents often or very often experienced a lack of variety in indigenous indoor plants).
2. Colourful plants (61.7% of respondents often or very often experienced a lack of variety in indigenous colourful plants).
3. Shade plants (58.8% of respondents often or very often experienced a lack of variety in indigenous shade plants).
4. Cold hardy plants (54.9% of respondents often or very often experienced a lack of variety in indigenous cold hardy plants).
5. Collectibles (47.8% of respondents often or very often experienced a lack of variety in indigenous plants of collectors' value).
6. Outdoor container plants (46.2% of respondents often or very often experienced a lack of variety in indigenous plants for outdoor containers).
7. Accent plants (40.9% of respondents often or very often experienced a lack of variety in indigenous accent plants).
8. Hedges (39.8% of respondents often or very often experienced a lack of variety in indigenous plants for hedges).
9. Fillers (39.2% of respondents often or very often experienced a lack of variety in indigenous fillers for large beds).
10. Shrubs (38% of respondents often or very often experienced a lack of variety in indigenous shrubs).
11. Replacements for invasive plants (37% of respondents often or very often experienced a lack of variety in indigenous replacements for invasive plants).
12. Erosion control, soil stabilization (35.9% of respondents often or very often

experienced a lack of variety in indigenous erosion control plants).

13. Drought-resistant plants (28.4% of respondents often or very often experienced a lack of variety in indigenous drought-resistant plants).

Edible plants:

7.26 Fruit trees

From the industry (including *all* the participants in the survey), it can be seen that 57.1% of respondents often or very often experienced a lack of variety in indigenous fruit trees in the market, 31% never or rarely did, and 12% of respondents didn't know whether there was a lack of variety in indigenous fruit trees in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 55.3% of respondents often or very often experienced a lack of variety in indigenous fruit trees in the market, 34.1% of respondents never or rarely did, and 10.6% of respondents didn't know if there was a lack of variety in indigenous fruit trees in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 60.7% of respondents often or very often experienced a lack of variety in indigenous fruit trees in the market, 24.6% never or rarely did, and 14.8% of respondents didn't know if there was a lack of variety in indigenous fruit trees in the market.

7.27 Vegetable seedlings

From the industry (including *all* the participants in the survey), it can be seen that 47% of respondents often or very often experienced a lack of variety in indigenous vegetable seedlings in the market, 31.5% never or rarely did, and 21.5% of respondents didn't know whether there was a lack of variety in indigenous vegetable seedlings in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 45.5% % of respondents often or very often experienced a lack of variety in indigenous vegetable seedlings in the market, 33.3% never or rarely did, and 21.1% of respondents didn't know if there was a lack of variety in indigenous vegetable seedlings in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 50% of respondents often or very often experienced a lack of variety in indigenous vegetable seedlings in the market, 27.6% never or rarely did, and 22.4% of respondents didn't know if there was a lack of variety in indigenous vegetable seedlings in the market.

7.28 Herbs – food

From the industry (including *all* the participants in the survey), it can be seen that 51.1% of respondents often or very often experienced a lack of variety in indigenous food herbs in the market, 31.3% never or rarely did, and 17.6% of respondents didn't know whether there was a lack of variety in indigenous food herbs in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 52.8% of respondents often or very often experienced a lack of variety in indigenous food herbs in the market, 30.9% never or rarely did, and 16.3% of respondents didn't know if there was a lack of variety in indigenous food herbs in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 47.5% of respondents often or very often experienced a lack of variety in indigenous food herbs in the market, 32.2% never or rarely did, and 20.3% of respondents didn't know if there was a lack of variety in indigenous food herbs in the market.

7.29 Herbs – medicinal

From the industry (including *all* the participants in the survey), it can be seen that 42.3% of respondents often or very often experienced a lack of variety in indigenous medicinal herbs in the market, 36.8% never or rarely did, and 20.9% of respondents didn't know whether there was a lack of variety in indigenous medicinal plants in the market.

From the responses from all the sub-categories dealing directly with the *consumer*, it can be seen that 43.1% of respondents often or very often experienced a lack of variety in indigenous medicinal herbs in the market, 35% never or rarely did, and 22% of respondents didn't know if there was a lack of variety in indigenous medicinal herbs in the market.

From the responses from all the sub-categories directly involved with the *growing* of ornamental plants, it can be seen that 40.7% of respondents often or very often experienced a lack of variety in indigenous medicinal herbs in the market, 40.7% never or rarely did, and 18.6% of respondents didn't know if there was a lack of variety in indigenous medicinal herbs in the market.

Comments from respondents on edible plants

From indigenous growers:

- We often experience a lack of variety in indigenous fruit trees in the market.
- There are no indigenous vegetables in South Africa.
- The interest in indigenous medicinal plants is debatable and it is a topic of political sensitivity.

From a garden center:

- Consumers never ask for indigenous edible plants, they prefer the well-

known kinds of fruit trees, vegetables and herbs. Indigenous fruit, vegetables and herbs are an unknown concept to most of them.

- Some well-known species such as Marula is sometimes asked for by customers, but these are very climate specific species and not available in our area.

In order to determine the order of importance of the four items in Question 7 where ***Edible plants*** were surveyed and the respondent had to indicate where he or she experienced a lack of variety in indigenous plants, the percentage for each item was calculated.

The degrees to which consumers experience a lack of variety of indigenous edible plants in the market is ranked below in descending order of importance

From the responses from *all* the participants of the industry, the biggest lack of variety was expressed as number 1, and the smallest lack of variety as number 4; the results were as follows:

1. Fruit trees (57.1% of respondents often or very often experienced a lack of variety in indigenous fruit trees).
2. Herbs for culinary use (51.1% of respondents often or very often experienced a lack of variety in indigenous food herbs).
3. Vegetable seedlings (47% of respondents often or very often experienced a lack of variety in indigenous vegetable seedlings).
4. Herbs for medicinal use (42.3% of respondents often or very often experienced a lack of variety in indigenous medicinal herbs).

4.4.9 Summary of the survey results on industry trends and market possibilities for indigenous plants

When the survey results across the questionnaire categories of growth form, special purpose plants and edible plants are integrated and summarised, the

following tendencies can be observed:

4.4.9.1 The most important set of horticultural groups for the introduction of new indigenous plants to the market

Below is a list of the most important set of horticultural groups suitable for the introduction of new indigenous plants. Between 72% and 52% of respondents indicated they had experienced a lack of variety in indigenous plants in these groups. The groups are ranked in descending order of importance, with 1 being the most important. This means number 1, indoor plants, have the biggest lack of variety.

1. Indoor plants (72.1%).
2. Annuals (66.1%).
3. Colourful plants (61.7%).
4. Climbers (59.8%).
5. Shade plants (58.8%).
6. Fruit trees (57.1%).
7. Aquatic plants (55.9%).
8. Ferns and foliage plants (55.7%).
9. Cold hardy plants (54.9%).
10. Grass and grass-like plants (54.6%).
11. Curiosity plants (52.2%).
12. Herbs for food (51.1%).

4.4.9.2 The second most important set of horticultural groups for the introduction of new indigenous plants to the market

Below is a list of the second most important set of horticultural groups suitable for the introduction of new indigenous plants. Between 50% and 40% of respondents said they had experienced a lack of variety in indigenous plants in these groups. The groups are ranked in descending order of importance, with 1 being the most important: This

means that number 1, in this case herbaceous perennials, have the biggest lack of variety.

1. Herbaceous perennials (49.5%).
2. Collectibles (47.8%).
3. Vegetables (47%).
4. Outdoor container plants (46.2%).
5. Medicinal herbs (42.3%).
6. Accent plants (40.9%).

4.4.9.3 The third most important set of horticultural groups for the introduction of new indigenous plants to the market

The market seems to be reasonably well supplied with indigenous plants in the horticultural groups listed below. Between 39% and 25% of respondents said they had experienced a lack of variety in indigenous plants in these groups. The groups are ranked in descending order of importance, with 1 being the most important: This means that number 1, in this case hedges, have the biggest lack of variety.

1. Hedges (39.8%).
2. Fillers (39.2%).
3. Shrubs and Cape flora (both 38%).
4. Replacements for invasive plants (37%).
5. Succulents (36.2%).
6. Erosion control and soil stabilization (35.9%).
7. Groundcovers (35.7%).
8. Bulbs (31.2%).
9. Drought resistant-plants (28.4%).
10. Trees (25.7%).

Although the market is well supplied in certain groups, such as indigenous trees and drought-resistant plants, the percentage of respondents still experiencing a lack of variety in these groups is large enough to warrant the introduction of new species; especially cold-hardy plants.

4.4.10 Question 8 Section E Growers selection criteria (put to growers)

The questionnaire for ornamental plant growers contained additional sections E and F, addressing issues specific to operations involved in the growing and production of plants. These sections included the following issues:

- Section E – Growers' selection criteria: quality, production and handling, market and economic considerations, horticultural criteria and domestication of wild plants.
- Section F – Competition for and limitations to the utilisation of indigenous plants for horticultural purposes.

These two sections of the questionnaire were put to parties involved in the growing of ornamental plants which, including:

- Large growers (mass production).
- Medium/small sized growers.
- Specialist growers.
- Indigenous growers.
- Research Institutions.
- Botanical Gardens.

Section E contained two questions, Question 8 with 47 items and Question 9 with seven items. The objective of this question was to determine growers' selection criteria for the horticultural use of indigenous plants.

How important are the following to you as a grower when making a choice on a new plant for commercial production?

The purpose of this question was to determine the importance of:

- The quality of a plant.
- Ease of production and handling of plants.
- Market and economic considerations in terms of a species or cultivar.
- The horticultural criteria which are important to growers in terms of propagation, garden performance and production time.

Quality

8.1 Resistance to major pests and diseases

The industry shows that 88.3% of growers regarded pest and disease resistance as important or very important.

8.2 Good quality retention at all times

The industry shows that 93.2% of growers regarded good quality retention at all times as important or very important.

8.3 Post production persistence

The industry shows that 98.2% of growers regarded post production persistence as important or very important.

8.4 Performance by flowering or lush foliage for a minimum period

The industry shows that 83.1% of growers regarded performance by flowering or lush foliage for a minimum period as important or very important.

8.5 Plants must cope with climate of geographical region

The industry shows that 96.6% of growers regarded that plants must cope with the climate of the geographical region as important or very important.

In order to determine the order of importance of the five items in Question 8 where quality was surveyed and the respondent had to rate the importance of the different aspects, the for each item was calculated.

The survey results of the listed growers' needs in respect of the quality of ornamental plants are ranked below in descending order of importance

The importance ratings range between the values of 1 and 5, with 1 being the most important and 5 the least. The percentage of respondents concurring with each of the ratings appears in brackets.

1. Post production persistence (98.2%).
2. Plants must be able to cope with the climate of given geographical region (96.6%).
3. Good quality retention over a reasonable time (93.2%).
4. Resistance to major pests and diseases (88.3%).
5. Performance in terms of flowering and the production of lush foliage over a minimum period (83.1%).

Production and handling:

8.6 Regular growth to ensure easy handling and standardisation

The industry shows that 91.4% of growers regarded regular growth of plants as important or very important.

8.7 Transportability of product

The industry shows that 84.7% of growers regarded transportability of plants as important or very important.

8.8 Ability to grow and supply all seasons

The industry shows that 79.3% of growers regarded growth of plants through all seasons as important or very important.

8.9 Crop turnover and production time

The industry shows that 84.2% of growers regarded crop turnover and production time of plants as important or very important.

8.10 Scheduling for market events

The industry shows that 61.8% of growers regarded scheduling for market events as important or very important.

Comments from respondents

From a medium sized grower:

- Production and handling and market and economic considerations vary according to the grower. Specialist growers are geared for their specific crop type which may not always be regular growth forms.

The survey results in respect of the production and handling of ornamental plants are ranked below in descending order of importance

The importance ratings range between the values of 1 and 5, with 1 being the most important and 5 the least. The percentage of respondents concurring with each of the ratings appears in brackets.

1. Regular growth to ensure easy handling and standardization (91.4%).
2. Transportability of product (84.7%).
3. Crop turnover and production time (84.2%).
4. Ability to grow and supply all seasons (79.3%).
5. Scheduling for market events (61.8%).

Market and economic considerations:

8.11 High yield at low production and maintenance cost

The industry shows that 82.5% of growers regarded a high yield at low production and maintenance cost as important or very important.

8.12 Adequate commercial life expectancy

The industry shows that 91.4% of growers regarded an adequate commercial life expectancy as important or very important.

8.13 Accepted in the market

The industry shows that 96.6% of growers regarded market acceptance as important or very important.

8.14 Market introduction and promotion costs

The industry shows that 72.4% of growers regarded market introduction and promotion costs as important or very important.

8.15 Market potential of new crop

The industry shows that 93.1% of growers regarded market potential of new crops as important or very important.

Comments from respondents

From indigenous growers: (six comments on marketing, all from indigenous growers)

- The success of the grower and indigenous plants on the market is all about marketing and service.
- Growers need market information on what is accepted in the market and the market potential of new crops in order to grow plants that the market wants.

There is a shortage of this type of information to growers.

- Growers experience a great need of knowledge and information on the consumer market.
- There are many plants available in the South African flora, but the market is specific in its needs and growers need to know what this is.
- Growers should not grow something the market is not interested in, and therefore not accepted in the market, but don't always have the knowledge of this.
- Growers need market information on the potential of new crops.

Below are the marketing and economic considerations guiding growers' decisions about whether to cultivate plants, ranked in descending order of importance

The importance ratings range between the values of 1 and 5, with 1 being the most important and 5 the least. The percentage of respondents concurring with each of the ratings appears in brackets.

1. Accepted in the market (96.6%).
2. Market potential of new crops (93.1%).
3. Adequate commercial life expectancy (91.4%).
4. High yields at low production and maintenance cost (82.5%).
5. Market introduction and promotion costs (72.4%).

Horticultural criteria – Propagation:

8.16 Vegetative propagation preferred

The industry shows that 78.2% of growers regarded vegetative propagation as important or very important.

8.17 Propagation by seed preferred

The industry shows that 57.1% of growers regarded propagation by seed as

important or very important.

8.18 Both seed and vegetative propagation used

The industry shows that 84.7% of growers regarded both seed and vegetative propagation as important or very important.

8.19 Other methods (e.g. tissue culture)

The industry shows that 66.1% of growers regarded other methods of propagation as not important or of little importance.

8.20 Method must be reliable and consistent

The industry shows that the reliability and consistency of the propagation method was important or very important to all the growers, namely 100%.

8.21 Clone material must be obtained

The industry shows that 59.6% of growers regarded clone material for propagation as important or very important.

The survey results in respect of the key propagation aspects important to growers are ranked below in descending order of importance

The importance ratings range between the values of 1 and 6, with 1 being the most important and 6 the least. The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. Propagation methods must be reliable and consistent (100%).
2. Ability to use both seed and vegetative methods of propagation (84.7%).
3. Preference for vegetative propagation (78.2%).
4. Clone material must be obtainable (59.6%).
5. Preference for propagation by seeding methods (57.1%).
6. Preference for other propagation methods (e.g. tissue culture) (33.6%).

Horticultural criteria – What is the minimum period of good garden performance you expect from the following crops?

8.22 Annuals (seedlings)

The industry shows that 15.7% regarded four weeks, 13.7% eight weeks, 49% twelve weeks, 11.8% sixteen weeks, and 9.8% regarded more than sixteen weeks as the minimum period of good garden performance for annuals.

8.23 Herbaceous perennials

The industry shows that 59.2% of growers regarded that the minimum period of good garden performance for herbaceous perennials should be more than 16 weeks.

8.24 Trees

The industry shows that 92.7% of growers regarded that the minimum period of good garden performance for trees should be more than 16 weeks.

8.25 Succulents

The industry shows that 82.4% of growers regarded that the minimum period of good garden performance for succulents should be more than 16 weeks.

8.26 Aquatic plants

The industry shows that 59.2% of growers regarded that the minimum period of good garden performance for aquatic plants should be more than 16 weeks.

8.27 Bulbs

The industry shows that 18.8% regarded four weeks, 18.8% eight weeks, 18.8% twelve weeks, 14.6% sixteen weeks, and 29.2% regarded more than sixteen weeks as the minimum period of good garden performance for bulbs.

8.28 Curiosity plants

The industry shows that 63.8% of growers regarded that the minimum period of good garden performance for curiosity plants should be more than 16 weeks.

8.29 Cape flora

The industry shows that 53.2% of growers regarded that the minimum period of good garden performance for Cape flora should be more than 16 weeks.

8.30 Shrubs

The industry shows that 73.1% of growers regarded that the minimum period of good garden performance for shrubs should be more than 16 weeks.

8.31 Climbers

The industry shows that 70.6% of growers regarded that the minimum period of good garden performance for climbers should be more than 16 weeks.

8.32 Grass and grass-like plants

The industry shows that 67.3% of growers regarded that the minimum period of good garden performance for grass and grass-like plants should be more than 16 weeks.

8.33 Groundcovers

The industry shows that 75% of growers regarded that the minimum period of good garden performance for groundcovers should be more than 16 weeks.

8.34 Ferns and foliage plants

The industry shows that 75.5% of growers regarded that the minimum period of good garden performance for ferns and foliage plants should be more than 16 weeks.

From the responses from growers it can be seen that the minimum period of good garden performance expected from the growth forms of indigenous plants in South Africa were as follows:

- Annuals: 12 weeks.
- Herbaceous perennials: more than 16 weeks.
- Trees: more than 16 weeks.
- Succulents: more than 16 weeks.
- Aquatic plants: more than 16 weeks.
- Bulbs: more than 16 weeks.
- Curiosity plants: more than 16 weeks.
- Cape flora: more than 16 weeks.
- Shrubs: more than 16 weeks.
- Climbers: more than 16 weeks.
- Grass and grass-like plants: more than 16 weeks.
- Groundcovers: more than 16 weeks.
- Ferns and foliage plants: more than 16 weeks.

Horticultural criteria – What is the maximum production and crop turnover time you expect from the following crops?

8.35 Annuals (seedlings)

The industry shows that 7.1% of growers considered four weeks as the maximum production and crop turnover time, 40.5% eight weeks, 26.2% twelve weeks, 21.4% sixteen weeks, and 4.8% considered that the maximum production and crop turnover time for annuals should be more than sixteen weeks.

8.36 Herbaceous perennials

The industry shows that 29.2% of growers considered 12 weeks as the maximum production and crop turnover time for herbaceous perennials.

8.37 Trees

The industry shows that 90.2% of growers considered the maximum production and crop turnover time for trees to be more than 16 weeks.

8.38 Succulents

The industry shows that 63% of growers considered the maximum production and crop turnover time for succulents to be more than 16 weeks.

8.39 Aquatic plants

The industry shows that 59.5% of growers considered the maximum production and crop turnover time for aquatic plants to be more than 16 weeks.

8.40 Bulbs

The industry shows that 62.2% of growers considered the maximum production and crop turnover time for bulbs to be more than 16 weeks.

8.41 Curiosity plants

The industry shows that 73.7% of growers considered the maximum production and crop turnover time for curiosity plants to be more than 16 weeks.

8.42 Cape flora

The industry shows that 65.8% of growers considered the maximum production and crop turnover time for Cape flora to be more than 16 weeks.

8.43 Shrubs

The industry shows that 76.6% of growers considered the maximum production and crop turnover time for shrubs to be more than 16 weeks.

8.44 Climbers

The industry shows that 60% of growers considered the maximum production and crop turnover time for climbers to be more than 16 weeks.

8.45 Grass and grass-like plants

The industry shows that 2.1% of growers considered four weeks as the maximum production and crop turnover time, 4.2% eight weeks, 31.3% twelve weeks, 20.8% sixteen weeks, and 41.7% considered that the maximum production and crop turnover time for grass and grass-like plants to be more than sixteen weeks.

8.46 Groundcovers

The industry shows that 2% of growers considered four weeks as the maximum production and crop turnover time, 16.3% eight weeks, 24.5% twelve weeks, 24.5% sixteen weeks, and 32.7% considered that the maximum production and crop turnover time for groundcovers to be more than sixteen weeks.

8.47 Ferns and foliage plants

The industry shows that 62.2% of growers considered the maximum production and crop turnover time for ferns and foliage plants to be more than sixteen (16) weeks.

Comments from respondents

From indigenous growers:

- The production time and crop turnover depends entirely on the species – not the category.
- Some plants are slow growing and take several years to mature, but could then fetch a good price on the market.

The majority of ornamental plant growers in South Africa considered the following as the maximum production and crop turnover time for the growth forms of indigenous plants:

- Annuals: eight weeks.
- Herbaceous perennials: 12 weeks.
- Trees: more than 16 weeks.
- Succulents: more than 16 weeks.
- Aquatic plants: more than 16 weeks.
- Bulbs: more than 16 weeks.
- Curiosity plants: more than 16 weeks.
- Cape flora: more than 16 weeks.
- Shrubs: more than 16 weeks.
- Climbers: more than 16 weeks.
- Grass and grass-like plants: more than 16 weeks.
- Groundcovers: more than 16 weeks.

4.4.11 Summary of the survey results on growers' selection criteria

When the survey results across the categories of plant quality, production and handling aspects, market and economic considerations and horticultural criteria in the growers' questionnaires are integrated and summarised, the following tendencies can be observed:

4.4.11.1 The most important set of growers' needs in respect of ornamental plants

Below appears the most important set of issues raised by growers, including the most important criteria for selecting indigenous plants for horticultural use in South Africa, as captured by the survey. Survey participants accorded importance ratings to these issues and criteria in

the order of between 90% and 100%. The itemised listing below is not in any order of importance.

- The propagation method selected for the plant must be reliable and consistent.
- The ability of the plant to adhere to rigorous quality standards, such as post-production persistence, ability to cope with the climate of a given geographical region and retention of its high quality features for prolonged periods.
- The market potential and economic viability of a new plant, such as acceptance by consumers, market potential and the commercial life expectancy of the crop.
- The plant must be of regular growth form to ensure ease of handling and standardization.

4.4.11.2 The second most important set of growers' needs in respect of ornamental plants

Below appears the second most important set of issues raised by growers, including the second most important set of criteria for selecting indigenous plants for horticultural use in South Africa, as captured by the survey. Survey participants accorded importance ratings to these issues and criteria in the order of between 80% and 89%. The itemised listing below is not in any order of importance.

- Growers want to use both seed and vegetative methods of propagation.
- Growers expect high yields at a low production and maintenance costs.
- Ease of transporting the product.
- The crop turnover and production times are important considerations.

4.4.11.3 The third most important set of growers' needs in respect of ornamental plants

Below appears the third most important set of issues raised by growers, including the third most important set of criteria for selecting indigenous plants for horticultural use in South Africa, as captured by the survey. Survey participants accorded importance ratings to these issues and criteria in the order of between 70% and 79%. The itemised listing below is not in any order of importance.

- Vegetative propagation is preferred by growers.
- Growers' ability to grow the crop and supply markets throughout the year.
- Market introduction and promotion costs are important considerations to growers.

4.4.11.4 Growers' needs in respect of ornamental plants that are of lesser importance

Below appear the set of growers' issues and selection criteria for ornamental plants captured by the survey which respondents considered to be of lesser importance than the preceding sets. Survey participants accorded importance ratings to these needs/criteria in the order of between 50% and 69%. The itemised listing below is not in any order of importance.

- Growers must be able to schedule crops for market events.
- Growers need to obtain clone material of the plant.
- Seed propagation is preferred by grower.

4.4.11.5 The least important growers' need of ornamental plants

Below appears the issue which respondents considered to be the least important (with an importance rating below 40%):

- Propagation methods other than seed or vegetative (e.g. tissue culture).

4.4.12 Question 9 Section E Domestication of wild plants (put to growers)

From your experience, how difficult or easy is the domestication process of wild plants?

The purpose of the question was to determine:

- How easy or difficult the domestication process of wild plants might be.
- Whether the domestication of wild plants in South Africa could be a restraining factor on the utilisation of indigenous plants for horticultural purposes.

9.1 Accessibility of plant material in its natural habitat

The industry shows that 61.4 % of growers found the accessibility of plant material in its natural habitat difficult or very difficult.

9.2 Identification of the plant

The industry shows that 50.9% of growers found the identification of a plant difficult or very difficult.

9.3 Biological studies of the plant (flowering time, pollination)

The industry shows that 64.9% of growers found the biological studies of a plant difficult or very difficult.

9.4 Determination of propagation methods

The industry shows that 58.9% of growers found the determination of

propagation methods of plants difficult or very difficult.

9.5 Determination of cultivation requirements

The industry shows that 71.4% of growers found the determination of cultivation requirements of plants difficult or very difficult.

9.6 Selection of horticultural superior forms of the plant (elite types)

The industry shows that 62.5% of growers found the selection of horticultural superior forms of a plant difficult or very difficult.

9.7 Improvement of the plant

The industry shows that 66.7% of growers found the improvement of plants difficult or very difficult.

Comments from respondents

From a botanical garden:

- Accessibility of plant material in its natural habitat is frustrating and difficult. The permit systems are not working; officials do not even answer the telephone!
- For the identification of the plant a good support system (trained professionals) is needed, otherwise it is difficult.
- Funding is a problem for programmes to determine cultivation requirements. However, botanical gardens have the potential to generate their own income.
- The selection of horticultural superior forms is very difficult. Generally growers in South Africa are not so much into that; they just take anything to propagate and are not looking at the best genetic material.

From a medium sized grower:

- Accessibility of plant material in its natural habitat is frustrating because

obtaining permits are very difficult.

- Selection of horticultural superior forms of the plant depends on the type of plant, it is not the same for all, and can vary from easy to difficult.

From indigenous growers:

- The domestication of wild plants varies with species.
- Accessibility of plant material in its natural habitat is difficult, but some plants (areas?) are more accessible.
- Determination of propagation methods is easy; with several exceptions.
- Accessibility is relatively easy. Environmental legislation is a good thing and not a too serious problem for sourcing new plants.
- The selection of horticultural superior forms and the improvement of the plant are relatively easy, but extremely time and space consuming.

Comments from interviewees during pre-testing of the questionnaire

Interviews to pre-test the questionnaire were conducted with six participants on 9 July 2009, which included one landscape architect, one horticulturist, three botanists and one retail nursery owner.

The following obstacles doing fieldwork in the wild (botanising and plant prospecting) were encountered:

- Physical accessibility to area with natural vegetation is difficult (terrain hostile).
- Personal safety problematic criminal elements, theft of equipment a problem, armed robbery even encountered by some of the interviewees.
- Health issues often problematic and diseases such as malaria and tick fever are encountered. Contaminated or no water, high temperatures and other climatic extremities as well as impenetrable bush thickets are often encountered.
- Environmental and legal regulations are restricting.

- Unrealistic expectations of benefit sharing by local communities.
- Security officials unfriendly – prohibiting access, sometimes want bribes, prohibiting photography and bullying soft target visitors.
- Funding to do field excursions and plant prospecting is scarce.
- Socio-political situation unstable or negative to visitors in some areas with high plant diversity.
- The collection of plant material in the wild is a difficult physical exercise in itself and viability of collected plant material very low.

Of these obstacles the interviewees encountered the first three the most often.

The survey results of the listed aspects of the domestication process of wild plants are stated below in descending order of difficulty

The difficulty ratings range between the values of 1 and 7, with 1 being the most difficult and 7 the least. The percentage of respondents concurring with each of the ratings appears in brackets.

1. Determination of cultivation requirements (71.4%).
2. Improvement of the plant (66.7%).
3. Biological studies of the plant (flowering time, pollination) (64.9%).
4. Selection of horticultural superior forms of the plant (elite types) (62.5%).
5. Accessibility of plant material in its natural habitat (61.4%).
6. Determination of the most appropriate propagation methods (58.9%).
7. Identification of the plant (50.9%).

4.4.13 Question 10 Section F Competition and limitations to the utilization of indigenous plants for horticultural purposes (put to growers)

Section E contained two questions, Question 10 with six items and Question 11 with nine items.

Question 10 Please indicate to which extent the following factors or situations are limiting the utilisation of indigenous plants with horticultural potential in South Africa:

The purpose of this question was to:

- Determine if there are underlying factors that might limit the utilisation of indigenous plants for horticultural purposes and what they are.
- Determine the parameters of the ornamental plant industry within which new indigenous plants with horticultural potential are to be accepted.

10.1 Other countries with a high botanical diversity

From the industry it can be seen that 59% of growers indicated that other countries with a high botanical diversity are not limiting at all to the utilisation of indigenous plants with horticultural potential in South Africa.

10.2 The market is saturated with certain plants

The industry shows that 62.5% of growers indicated that market saturation with certain plants is limiting or limiting to a large extent the utilisation of indigenous plants with horticultural potential.

10.3 Availability of indigenous plants to substitute popular horticultural plants such as roses and palms

The industry shows that 82.1% of growers indicated that the availability of indigenous plants to substitute popular horticultural plants is limiting or limiting to a large extent the utilisation of indigenous plants with horticultural potential.

10.4 Widening of geographic distribution of existing ornamental plants

The industry shows that 73.6% of growers indicated that the widening of geographic distribution of existing ornamental plants is limiting or limiting to a large extent the utilisation of indigenous plants with horticultural potential.

10.5 New exotic plants coming onto the market

The industry shows that 70.2% of growers indicated that new exotic plants coming onto the market is limiting or limiting to a large extent the utilisation of indigenous plants with horticultural potential.

10.6 The market dominance of certain plants limiting new entries

The industry shows that 61.4% of growers indicated that the market dominance of certain plants is limiting or limiting to a large extent the entry of indigenous plants to the market.

Comments from respondents

From a botanical garden:

- The problem of the limited use of indigenous plants originates at training institutions. Not enough background and knowledge on indigenous plants is given to horticultural and landscape architect students. Training should be done in more detail on suitable indigenous plants for each climatic region.
- From large growers (mass production):
- The competition for market space in the ornamental plant sector is severe.
- In times of economic survival, large wholesalers stick to profitable lines, whether indigenous or exotic, is not important.

From indigenous growers:

- The current economic climate is also dire in the nursery industry which is a limiting factor in the turn-over of all ornamental plants including indigenous plants.
- *It is difficult for indigenous plants to compete in the market, because roses, lavender, hydrangeas and primroses have a far greater pull when trying to impress mommy or the girl friend!*

- *Remember only 5% of South African public plant ornamental gardens. This is the single biggest stumbling block in our industry!*
- Local utilisation is limited, but there is a large export potential and overseas market for South African flora.

Below is the list of limiting factors ranked in order of importance

The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. Availability of indigenous plants as substitutes for popular exotic horticultural plants, such as roses, conifers and palms (82.1%).
2. Widening of the geographic distribution of existing ornamental plants (73.6%).
3. New exotic plants coming onto the market (70.2%).
4. The market is saturated by plant varieties (62.5%).
5. The market dominance by certain plants limiting new entries (61.4%).
6. Plant imports from countries with a high botanical diversity (41%).

4.4.14 Question 11 Section F Competition and limitations to the utilisation of indigenous plants for horticultural purposes (put to growers)

Question 11 In your opinion, which of the following sources for new ornamental plants may be important in the future?

The purpose of this question was to determine:

- What the sources of new ornamental plants coming onto the market are.
- If South African indigenous plants from the wild are regarded with confidence by growers as a source of new ornamental plants for the future.

- If alternative sources compete with wild plants as a source of new ornamental plants in South Africa.

11.1 Fashion revivals and re-introductions

The industry shows that 84.2% of growers indicated that fashion revivals and re-introductions are important or very important sources of new ornamental plants in the future.

11.2 Collectors of unusual plants

The industry shows that 58.6% of growers indicated that the collectors of unusual plants are important or very important sources of new ornamental plants in the future.

11.3 Specialist nurseries

The industry shows that 79.7% of growers indicated that specialist nurseries are important or very important sources of new ornamental plants in the future.

11.4 Renewed interest in heritage plants and old cultivars

The industry shows that 72.9% of growers indicated that the renewed interest in heritage plants and old cultivars is an important or very important source of new ornamental plants in the future.

11.5 Horticultural neglected plants receiving new attention

The industry shows that 84.2% of growers indicated that horticultural neglected plants receiving new attention are important or very important sources of new ornamental plants in the future.

11.6 Botanical gardens and their nurseries

The industry shows that 78.8% of growers indicated that botanical gardens and their nurseries are important or very important sources of new ornamental plants in the future.

11.7 New applications for known plants

The industry shows that 57.9% of growers indicated that new applications for known plants are important or very important sources of new ornamental plants in the future.

11.8 New cultivars of existing plants

The industry shows that 84.5% of growers indicated that new cultivars of existing plants are important or very important sources of new ornamental plants in the future.

11.9 New indigenous plants from the wild

The industry shows that 91.5% of growers indicated that new indigenous plants from the wild are important or very important sources of new ornamental plants in the future.

Comments from respondents

Indigenous grower:

- New applications for known plants are important, indigenous plants also have excellent potential for example to make pruned hedges, and other shapes.
- New plants from the wild are very important, especially for specific climate and soil types.

Specialist grower:

- Botanical gardens and their nurseries are mostly neglected as a source of new ornamental plants. Formal institution and society officials also tend to be sentimentalists (“tree huggers”) and in a way are over-protective of our flora and in effect hamper the sourcing of new indigenous plants for commercialisation.
- New cultivars of existing species are very important as a source of new

ornamental plants, particularly if the performance of the plants improve.

- New indigenous plants from the wild are the most important and exciting source of new ornamental plants.

Below is a list of sources of new ornamental plants that can be exploited in future, ranked in descending order of importance

The percentage of respondents concurring with each of the ratings is indicated in brackets.

1. New indigenous plants from the wild (91.5%).
2. New cultivars of existing plants (84.5%).
3. Fashion revivals and the reintroduction of previously neglected plants (both 84.2%).
4. Specialist nurseries (79.7%).
5. Botanical gardens and their nurseries (78.8%).
6. Renewed interest in heritage plants and old cultivars (72.9%).
7. Collectors of unusual plants (58.6%).
8. New applications for known plants (57.9%).

4.5 Conclusion

From the responses to the survey and the resultant interpreted data, most of the pertinent issues in determining selection criteria for ornamental plants and the limiting factors in the horticultural use of indigenous plants have been identified and their importance have been established.

This quantitative data can now be used in Chapter 5 to draw to conclusions and formulate recommendations for the different sectors of the industry to increase the horticultural use of indigenous plants in South Africa.

CHAPTER 5

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter is to demonstrate the varying degrees of influence and relative importance of those factors and considerations, covered by the research survey, in determining ornamental plant selection in South Africa. The data used to accomplish this task have been gathered from a statistical analysis of responses to the survey. The data have also been used to provide answers to the main problem and three sub-problems as formulated in Chapter 1 of the thesis, and, by logical progression, to address the three hypotheses postulated in that chapter.

The main problem statement is restated below for ease of reference:

Problematic selection issues in respect of sourcing new ornamental plants from indigenous South African flora arise when using only the physical characteristics of plants. There are important consumer needs that are not sufficiently met by growers, and growers' needs that are not sufficiently addressed by the research institutions and in the selection processes that may require attention by the growers and research institutions in the sourcing of new ornamental plants. In addition, there are a number of factors limiting the range of horticultural uses of indigenous plants in South Africa. The use of indigenous plants is also subject to competition from exotic plants in the market.

The main problem statement can be divided into three sub-problems which are discussed in the course of this chapter. This chapter also contains a discourse on the various selection criteria for the horticultural use of indigenous plants in

South Africa, as applied by the relevant interest groups, namely growers, retailers, landscapers, gardening professionals and ordinary consumers.

The research, as documented in this thesis, proves firstly, that consumers' needs and expectations are not sufficiently met by growers; secondly, that growers' requirements have been neglected by research institutions, and thirdly, that consequently both these aforementioned factors are inhibiting a more widespread use of indigenous plants as ornamentals. This treatise furthermore contains specific recommendations on how the use of indigenous plants may be increased, based on the findings and conclusions produced by this research.

The researcher conducted a survey among institutions involved in the growing of ornamental plants, retail nurseries and landscapers in South Africa during 2009 and 2010 in order to construct a workable framework for the collection and evaluation of pertinent data about the use of indigenous plants in this country. The outcomes will be interpreted within the context of the three sets of guiding parameters laid down at the outset of this study in Chapter 1, namely (i) the five research scope delimitations, (ii) the two key assumptions made for purposes of this research and (iii) the four main study objectives.

This survey covered the following areas of investigation:

1. Consumers' knowledge of and attitudes towards indigenous plants.
2. The criteria normally applied by consumers when selecting ornamental plants. This section of the survey included questions related to consumers' needs in respect of ornamental plants, such as those plant attributes most looked-for by consumers, as well as the most sought-after features and qualities of horticultural performance.
3. Growers' criteria for selecting ornamental plants, including key aspects of production and handling, marketing and economic viability, methods of plant propagation, the expected periods of garden performance, production and crop turnover times, and the likely ease or difficulty with

which various types of wild plants may be domesticated.

4. Trends in the industry related to the horticultural use of indigenous plants in South Africa, as well as new marketing opportunities.
5. Competition by exotic plants inhibiting a more widespread use of indigenous plants in horticultural applications in South Africa, as well as other related restraining factors.
6. Local sources of new ornamental plants.

In this chapter the outcomes of each of these areas of investigation are presented in three parts, namely:

1. The first part contains a discussion of the findings of the research related to each given area of investigation; while
2. The second part describes the conclusions reached, based on the findings; and
3. The third part contains recommendations.

The outcomes of the survey covering each of the six areas of investigation are presented in the following sections of this chapter.

5.2 Selection criteria for the horticultural use of indigenous plants in South Africa

Some definitive findings related to the horticultural use of indigenous plants in South Africa were established in terms of consumers' needs and growers' issues in Chapter 4. The purpose of Chapter 5 is to use these findings to develop appropriate criteria for the selection of indigenous plants for horticultural use that would satisfy the needs of both consumers and growers.

The data collected in the survey about the needs of consumers and growers have also been used to provide answers to the first sub-problem.

Sub-problem 1

Identifying the problematic issues related to the criteria for selecting indigenous South African flora as new ornamental plants in horticultural applications and producing solutions to overcome or mitigate their effects.

Hypothesis 1

Based on the above statement, Hypothesis 1 has been formulated as follows:

It is postulated that appropriate selection criteria can be formulated (a) to meet the needs of consumers when considering the acquisition of new indigenous plants for horticultural use, as can be selection criteria (b) to meet the needs of growers either when making decisions at the onset of research programmes for the development of new horticultural crops of indigenous plants, or when sourcing new plants from the wild.

This hypothesis will be examined in the sections following hereafter and evidence will be offered to prove or disprove it.

The first area of investigation referred to in Item 5.1, i.e. consumers' knowledge about and attitudes towards indigenous plants is discussed next and is followed by an exposition of the findings related to those aspects of ornamental plants that consumers deem important. Thereafter the conclusions reached, and the ensuing recommendations are given.

5.3 Consumers' knowledge of and attitudes towards indigenous plants

The research revealed a number of crucial features related to consumers' knowledge about and attitudes towards ornamental plants in general, and

indigenous ornamental plants in particular. The research results have been used in this chapter to put the South African ornamental plant industry into perspective, so as to serve as background against which the three sub-problems will be addressed.

5.3.1 Discussion of the findings about consumers' knowledge of and attitudes towards indigenous plants

5.3.1.1 Consumers' positive attitudes towards indigenous plants

Consumers' attitudes towards the use of indigenous plants are generally positive, as borne out by purchasing trends in general. Approximately 50% of ornamental plant customers in South Africa specifically ask nurseries and suppliers for indigenous plants. It is clear that there is a strong and sustained demand for indigenous plants in the market.

In their study, Parker & Malone (2004:19) found that many South Africans purchasing plants within the formal, commercial sector of the market continue to exhibit a pronounced preference for using a combination of indigenous and exotic plants in their gardens.

A similar trend is also discernible in the gardens of the predominantly black townships and elsewhere in the informal sector which accounts for a large number of people living at the lower end of the socio-economic scale in South Africa (Lubbe *et al.* 2010:2900).

The assumption made in Chapter 1 of this study that exotic plants make up the majority of ornamental plants in use in South Africa today and that they will continue to hold their position of preponderance for the foreseeable future, was, however, not conclusively determined by this research; consequently, one has to concede that that assumption can therefore neither be confirmed nor

disproven by the findings of this study.

The findings do suggest that the majority of consumers (both wholesale consumers and end-users) are aware of the general benefits of indigenous plants, such as, better survival rates during droughts, their attraction to wildlife, supporting conservation and promoting a general appreciation of indigenous flora.

However, most consumers lack specific knowledge about certain aspects of indigenous plants related to, for instance, plant identification, plant names, attributes, suitability for specific applications and situations, etc. The following comments by landscape architects and landscape contractors who participated in the research survey tend to support this assertion:

Customers are knowledgeable about the benefits of indigenous plants, probably due to media coverage and popular demand (fashion) and/or environmental awareness. However, they have no knowledge about the plants themselves, such as which species to use or their growth requirements.

and

Developers often specify that all plantings for certain types of development, such as a corporate park or residential security complex should be indigenous, but that is where it ends. They are not able to suggest any specific species.

The findings of this study also suggest that consumers generally rely on the expertise of suppliers for this kind of specialised information. Furthermore, it was found that wholesale consumers (retailers and landscapers) are usually much better informed and more

knowledgeable about indigenous plants than other end-users.

5.3.1.2 Fundamental ornamental plant attributes

In contrast to plants that yield utilitarian products, ornamental plants are appreciated for their aesthetic qualities and are primarily used to beautify the living environments of consumers.

Simpson & Ogorzaly (2001:399) observe that the yardstick of what is considered beautiful or aesthetically pleasing is largely determined by cultural considerations, and may differ from country to country, may show regional variances within the same country, may differ from individual to individual and from generation to generation.

Kariuki *et al.* (2011:79) state that Sub-Saharan African cultures also recognise the aesthetic appeal of ornamental plants. Authors such as Coetzee *et al.* (2007) and Molebatsi *et al.* (2010: 2962), found that ornamental plants, as a use category, form an important part of the home gardens of local indigenous cultures, and are especially in evidence in the urban and peri-urban areas of South Africa.

This survey found that South African consumers in the formal commercial sector generally consider the fundamental ornamental plant attributes, namely attractiveness and good garden performance, far more important than the origins of plants.

5.3.1.3 Factors that have a negative impact on indigenous plant sales and usage

There are several factors that have a negative impact on the sales and usage of indigenous plants as ornamentals in the market. Firstly, customers often prefer certain exotic plants, irrespective of

whether indigenous substitutes are available; secondly, the majority of respondents often found the general appearance of indigenous plants to be 'untidy'; (comments from growers indicated that this is especially true in the case of bushveld and fynbos and, thirdly, customers have entrenched shopping habits which are difficult to change.

Survey participants' comments produced the following examples of entrenched shopping habits among consumers:

Comments by a large grower:

Customers want old well-known plants that are guaranteed to be successful, easy to grow and that remind them of old familiar gardens and sentimental times.

Comments by a representative of a leading garden centre:

Entrenched shopping habits are only apparent in certain lines, e.g. bedding plants, such as petunias, fruit trees, roses, palms and conifers. These are mostly benign exotics.

This study established that the first two factors (preference for certain exotic plants and the 'untidy' growth habit of indigenous plants) are more important than the third (entrenched shopping habits) in ultimately determining consumers' plant purchasing preferences.

5.3.2 Conclusions in respect of consumers' knowledge about and attitudes towards indigenous plants

5.3.2.1 Consumers' knowledge and attitudes

The general positive attitude of consumers towards indigenous

plants and knowledge about their benefits must be recognised and exploited to improve market awareness and the popularity of these plants. On the other hand, end-users in general do not seem to have the specialised kind of knowledge about indigenous plants regarding the most suitable plant selection options.

Furthermore, the finding that wholesale consumers (retailers and landscapers) are usually better informed and more knowledgeable about indigenous plants than other end-users (such as retail consumers), suggests that one could conclude that the landscapers and retailers are indeed the opinion leaders in the industry.

Because of the huge influence which these two groups exert in the market, growers are especially dependent on them to promote their new plant offerings among retail outlets and end-users.

Growers and research institutions should therefore make every effort to provide specialised information about and even training in respect of indigenous plants to wholesalers, retailers and landscapers so as to help them to pass on key elements of that knowledge to retail outlets and to other end-users. An improved flow of practical knowledge about indigenous plants will undoubtedly help every role-player in the marketing chain down to the ordinary end-user to make more informed decisions about those ornamental plants best suited to their requirements.

5.3.2.2 Dissemination of information within the industry

The growers have a responsibility to disseminate more detailed information about the indigenous plants they are cultivating among the retailers and landscapers who usually play a major role in determining how, where and when which of these plants are to be

used.

Retailers and landscapers likewise have a special responsibility to raise public awareness by providing end-users with more useful and more detailed information about indigenous ornamental plants.

5.3.2.3 Fundamental ornamental plant attributes

It is essential that indigenous plants should meet certain minimum requirements related to fundamental ornamental plant attributes, such as attractiveness and good garden performance, in order to maintain their market share and to compete successfully with other varieties. Sentimental considerations in favour of indigenous plants are, on their own, simply not good enough to ensure an increase in their popularity among consumers.

5.3.2.4 Factors inhibiting the use of indigenous plants

One should identify the factors inhibiting the use of indigenous plants and correct them, where possible.

5.3.2.4.1 One should, however, not attempt to discredit the attributes of benign exotic plants, as they have become entrenched as an integral part of the ornamental plant industry the world over, including South Africa.

5.3.2.4.2 On the other hand, one should be aware of the undesirable natural characteristics of those indigenous plants used for ornamental and decorative purposes; domestication programmes should therefore be designed to add desirable characteristics to plants or remove unwanted ones.

5.3.2.4.3 While it may be difficult to change some of the more entrenched shopping habits among consumers, it may be possible to achieve some changes in traditional plant purchasing trends through proper marketing, the effective dissemination of information among end-users and by exploiting consumers' appetite for new and adventurous products (73.5% of respondents stated that consumers were receptive to new plant varieties).

5.3.2.4.4 Ornamental plants are generally perceived to be expensive and a luxury, especially during periods of economic down-turn. This suggests that an expansion of the market in indigenous ornamental plants may be much supported if it were possible to achieve cost and price reductions in these commodities.

Although the market for indigenous ornamental plants within the large informal sector of the South African economy did not form part of the original research for this study, it stands to reason that this segment may offer significant market expansion opportunities, if it could be more extensively penetrated. At present, people who constitute the greatest part of the informal sector seldom acquire their garden plants from nurseries and garden centres operating in the formal commercial sector. Appropriate marketing strategies aimed at this particular segment of the population, combined with affordable pricing, could boost the overall usage of indigenous ornamentals in the gardens of our country.

5.3.3 Recommendations about consumers' knowledge of and attitudes towards indigenous plants

Marketing and promotion efforts by retailers, landscapers and growers should concentrate on the benefits of those indigenous plants that are commercially available.

Plant growers should invest in efforts to disseminate information about the benefits of indigenous plants they are cultivating among their wholesale customers, the retailers and landscapers. This should help to increase the utilisation of indigenous plants for horticultural purposes, and ultimately improve growers' turnover and profits from this type of plants.

In terms of propagation, cultivation and marketing considerations, the fact that a plant is indigenous should never outweigh the importance of ensuring that ornamentals are endowed with the universally-accepted fundamental plant attributes, namely attractiveness and good garden performance.

Factors inhibiting the use of indigenous plants should be corrected or overcome where possible, for instance, by applying appropriate selection criteria to bring the most viable new products to market and by using innovative and creative marketing strategies to increase the sales of existing ones.

5.4 Consumers' selection criteria for ornamental plants

This area of investigation covered the criteria normally applied by consumers when selecting ornamental plants. This section of the survey included questions related to consumers' needs in respect of ornamental plants, such as those plant attributes most looked-for by consumers, as well as the most sought-after features and qualities of horticultural performance. (See also Section 4.4.7 of Chapter 4 for a summary of the survey results on market

demand and consumers' selection criteria).

5.4.1 Discussion of the findings about consumers' needs in respect of ornamental plants

Research by Lohr & Relf (1993:106) has demonstrated that ornamental plants can exert a remarkably beneficial influence on every kind of human behaviour, ranging from the most basic physical activities to the most advanced psychological experiences. They hold that the advantages for human beings interacting with horticulture are predominantly manifested in three major spheres, namely environmental, therapeutic and economic.

By recognising the fact that horticulture can exercise such a profoundly positive influence on human behaviour, and can indeed contribute much to a human being's sense of wellbeing, it follows then that one should carefully determine the various, multilayered and often complex human needs that plants are expected to fulfil. A thorough appreciation of those needs should, in turn, help one select the most appropriate plants called for by any particular set of requirements. This axiom holds true for all types of horticultural endeavour, including the use of ornamental plants.

Employing appropriate plant selection criteria to match human needs should therefore also find useful application in crafting effective marketing strategies for indigenous ornamentals.

Apart from their physical characteristics which often serve as the primary reason why people buy specific ornamental plants, the results of this study show that consumers apply further selection criteria when choosing plants in order to meet their needs. These selection criteria may vary in importance according to individual consumers' requirements.

For example, although consumers' concerns about non-poisonous plants (56.4%) and fashionable plants (54.3%) scored the lowest survey ratings, these criteria were considered significant enough for inclusion in the study. However, compared to the higher ratings which the other selection criteria choices attracted (discussed below), these two should be considered the least important among their peers. Concerns about poisonous plants were raised in relation to the dangers they posed especially to young children.

There was also a considerable variance between the importance ratings given by wholesale consumers (retailers and landscapers) and end-users about plants considered fashionable at any given moment. Wholesale consumers (64.6%) were found to be much more fashion-conscious than end-users (48.8%), and these results confirm yet again that the former should be regarded as the fashion trendsetters of the industry.

The survey results showed that consumers accorded the highest scores to three main plant selection considerations, viz.: (i) plants requiring low levels of maintenance (97.3%); (ii) plants not causing too much inconvenience (91.4%); and (iii) plants easily fitting into and complementing modern lifestyle environments (91.3%), e.g. their suitability for small gardens and indoor living and working spaces. Many people also choose plants for their culinary herb and vegetable gardens, nowadays often carved from rather limited surface areas.

Parker & Malone (2004:19) found that as urban gardens have shrunk considerably in size since the 1970s, many gardeners have since then started cultivating plants in containers or have been obliged to work in more confined areas.

Lubbe *et al.* (2010:2900) observed that houses in the sprawling black urban townships of South Africa generally also tended to have small gardens, albeit

mainly for historical reasons.

Townhouse complexes, security-enclosed housing estates and retirement villages are now major trends in urban residential development. These contemporary types of residential dwellings are invariably relatively compact in size and so are their companion gardening areas.

Modern day pressures and growing security concerns have given rise to a fairly recent lifestyle phenomenon called “cocooning”. Sittig (2003) states that the “cocooning” lifestyle will gain even more momentum in the 21st century, resulting in more people spending their free time staying at home more often rather than going out and, hence, have more time to enjoy their gardens.

Added to the phenomenon of “cocooning”, one should consider the impact of the modern age which is speeding up the pace of living around the world: for many people time itself is becoming a precious rare commodity. Furthermore, people nowadays are getting used to things happening very quickly; in many cases they have become accustomed to the notion of obtaining almost instantaneous results and to the astounding rapidity at which information may be accessed.

Consequently, many consumers hold the same kind of expectations when purchasing plants, inasmuch as they ought to bring rapid improvements to their living and work environments and deliver almost immediate gratification. This view was indeed held by 85.6% of survey respondents.

The speed and ease with which we can access information through revolutionary technological innovation these days do not seem to have quenched mankind’s thirst for new knowledge. Indeed, quite the reverse is true, because the adage *scientia potentia est*, or “knowledge is power”, has remained one of the most enduring mantras throughout the course of human history

(dictum from the 16th century, commonly attributed to Sir Francis Bacon) (http://en.wikipedia.org/wiki/Scientia_potentia_est, accessed 22-05-2012).

It is therefore understandable that people, having made an investment in acquiring some plants, would also want to know how to look after them: according to the survey results 75.3% of consumer respondents expressed a need for specialised plant information (e.g. plant name, behaviour and care), while 73.5% of them indicated that they desired new varieties of plants (being novel, exciting, fresh and stimulating).

Kariuki *et al.* (2011:77) found that 'lifestyle horticulture' or environmental horticulture has also established itself as a feature in the many parts of Sub-Saharan Africa that are becoming increasingly urbanised and industrialised.

There thus seems to be a lifestyle "megatrend" taking shape in many parts of the world which involves (a) the rising popularity of environmental horticulture and (b) being practiced in relatively small spaces.

By extrapolating these trends into the future, one must assume that smaller living spaces and compact gardens brought about by the latest residential building configurations, combined with the kind of lifestyle expectations inspired by the modern age, will increasingly become more evident in our own country and in the densely populated metropolitan conglomerations elsewhere in Sub-Saharan Africa.

Projected against the backdrop of these changing lifestyle trends, the identification of the most appropriate selection criteria for indigenous ornamental plants to meet modern consumers' often multifaceted horticultural needs becomes all the more relevant and pressing.

In addition, this study's outcomes in determining the most suitable indigenous

ornamental plant selection criteria should also benefit consumers engaged in the older, more established forms of gardening and landscaping in South Africa, enjoying the advantages, as they do, of larger outdoor areas and more commodious residential accommodations.

5.4.2 Discussion of the findings regarding those ornamental plant attributes important to consumers

This research has established that the neat appearance of a plant is the most important physical attribute when used for ornamentation (97.3% of respondents agreed with this proposition), while the size of flowers is of lesser importance. This finding confirms the supposition that the general “untidy” appearance of indigenous flora reduces their attractiveness as ornamental plants (65.1% of respondents). Comments from respondents suggest that the popularity of especially fynbos and bushveld plants suffer under the perceived taint of “untidiness”. This researcher believes that it is especially true for the woody component of these vegetation types (especially shrubs and certain types of trees).

On the other hand, comments from indigenous plant growers indicate that there is definite interest in so-called “untidy” plants among the operators of game farms and game lodges, because these plants match and blend in with the natural environment of such establishments.

The ultimate size of the plant is, of course, another very important consideration (according to 89.8% of respondents). So are plants that attract wildlife (82.4%). Other considerations, such as the colour of their flowers (81.3%) and their shape (76.9%) also featured as important selection criteria. The scent of the flowers (60.2%) outranked flower size in importance, with flower size (51.9%) emerging as the least important criterion.

5.4.3 Discussion of the findings on the horticultural performance of ornamental plants important to consumers

Townsley-Brascamp & Marr (1995:199) and Stanley (2003:18) identified several aspects of horticultural performance that consumers deemed important. These authors found that price, plant health and quality, suitability for the consumer's garden, final height, shape, bushiness (neat compact growth form), flower and leaf colour all played a significant role in determining consumers' plant preferences.

The survey results suggest that, to a large degree, South African consumers hold similar preferences: (i) the quality of the plant (its overall appearance, health, attractiveness) and (ii) good garden performance (flowers, leaves) were both rated as the most, but equally important criteria (94.7%); while (iii) the suitability of the plant for a specific climate and (vi) the durability of the plant were rated very highly (85.1% and 81.9%, respectively); (v) plants adapted to conform to "water wise" practices (76.4%) and (vi) those with good resistance to pests and diseases (75.5%) also achieved relatively high importance ratings.

5.4.4 Conclusions and recommendations regarding consumers' criteria for selecting ornamental plants

5.4.4.1 Conclusions and recommendations regarding consumer needs in respect of ornamental plants

It can be concluded that all the consumer needs and expectations covered in the survey in respect of ornamental plants are important enough for use as criteria in the selection process.

The convenience and low maintenance benefits of indigenous plants must be emphasised during sourcing and promotion of such plants. Growers should stay in touch with retailers and landscapers

about changing market trends in lifestyle complementing plants and plants in fashion, so that they may adapt their assortment of indigenous plants accordingly and have them ready in good time for the market.

For those consumers requiring immediate results in landscaped areas or gardens, the correct size and stage of flowering of a plant are important. Consumers should be willing to pay a little more for plants with these attributes, since the cultivation time for indigenous plants is relatively long (for most groups of indigenous plant species it takes longer than 16 weeks), resulting in higher input costs to growers cultivating them for the market.

There is great responsibility on growers and research institutions to supply detailed information on indigenous plants to the retailers and landscapers to enable them to keep the end-user better informed.

There are several poisonous plants in the ornamental plant industry worldwide, including several indigenous South African plants (notably representatives of the Apocynaceae and Euphorbiaceae families). Customers should be warned of the hazardous nature of poisonous indigenous plants through appropriate notices on plant labels, especially in the case of pot plants and cut flowers that may come in direct physical contact with consumers.

5.4.2.2 Conclusions and recommendations about ornamental plant attributes important to the consumer

It can be concluded that all the plant attributes covered in the survey, while varying in relative weighting, are all important enough to the consumer to warrant their use as criteria for selection.

When sourcing new plants from the wild the general appearance of the plant, its final size and shape were also deemed important by survey respondents. Plants should be selected bearing in mind their ultimate end-use.

The attraction of wildlife is a well-recognised and highly valued attribute of ornamental plants. This fact should be highlighted even more in the marketing and promotion of indigenous plants. Marketing campaigns should clearly state what type of indigenous plants is most likely to attract what kind of wildlife to the consumer's garden or landscaped environment.

According to the survey results, consumers regard the scent of flowers and the pleasant aroma from the leaves of some indigenous plants more highly than the size of flowers. The alluring scents produced by indigenous plants should also be emphasised in the marketing and promotion of such plants. Plant growers should be encouraged to concentrate on cultivating indigenous plants that produce pleasant smelling flowers instead of just larger sized ones.

5.4.4.3 Conclusions and recommendations about aspects of the horticultural performance of plants important to consumers

It can be concluded that all the aspects of horticultural performance of ornamental plants covered in the survey are very important to consumers and should be used as selection criteria.

New varieties of indigenous plants being introduced to the market should carry all the desirable attributes identified through this research. The domestication of new plant varieties plays an important part in shaping their horticultural performance.

Research institutions and growers cultivating indigenous plants should make the results of their trials available to retailers and landscapers. This kind of information will enable retailers and landscapers to supply the most appropriate plants to their customers or to advise them about which plants should deliver the desired results. In addition, this exchange of information should also minimise the chances of customers later being disappointed with the performance of the plants they had acquired.

Retailers and landscapers are under a reciprocal obligation to provide feedback to cultivators and researchers about the results obtained with indigenous plants used for gardening and landscaping purposes.

5.5 Growers' criteria for selecting ornamental plants

This area of the investigation covered the growers' criteria for selecting ornamental plants, including key aspects of production and handling, marketing and economic viability, methods of plant propagation, the expected periods of garden performance, production and crop turnover times, and the likely ease or difficulty with which wild plants may be domesticated

This section contains a discussion of those criteria deemed important by growers when selecting indigenous ornamentals for commercial cultivation, an explanation of the study's findings, the conclusions reached; and a *caveat* concerning recommendations and expert input.

5.5.1 Discussion of the findings regarding growers' needs in respect of the quality aspects of ornamental plants

Armitage (1998:254) suggests that excellent garden performance is a

prerequisite for landscape (amenity) plants. Good garden performance is primarily gauged by persistent flowering or lush, colourful foliage throughout the growing season.

Growers naturally also value aspects such as ease of plant production and the absence of serious diseases and pests.

According to Segers (2001:18), integrated pest control management will become increasingly more important in the future, in order to improve plants' resistance levels to various types of new, more aggressive or mutated pathogens. It may, however, also result in higher input costs for growers.

Further quality considerations for growers are plants' ability to cope with the climatic conditions of a given geographic region, effective post-harvest management procedures for ensuring the quality and safety of crops, long product life and good transport tolerance (Segers, 2001:16). Armitage (1998:252) suggests that all too stringent post-harvest limitations may impede the market entry of some types of new plants.

The results of this survey showed that all the quality aspects of ornamental plants covered by the survey were very important to South African growers.

When choosing a new plant variety for production, growers participating in the survey ranked the five key quality criteria choices as follows: (i) 98.2% for a plant's post-production persistence; (ii) 96.6% for its ability to cope with the climate of given geographical region; (iii) 93.2% for quality retention over a reasonable period; (iv) 88.3% for robust resistance to pests and diseases; and (v) 83.1% for good horticultural performance in terms of flowering and the production of lush, colourful foliage within a minimum period.

5.5.2 Discussion of the findings regarding growers' needs in respect of the production and handling aspects of ornamental plants

Growers are naturally concerned about the amount of labour that will be required for tending a new crop and for post-production handling, sorting, packaging and processing. The labour intensity of these activities may be influenced by the new plants' growth form (being regular or otherwise). The overall expenditure on energy (high, medium or low) needed for cultivating a new crop is a further cost concern to growers (Segers, 2001:17).

According to Armitage (1998:254), growers should be able to schedule a new crop's growth cycle in such a way that the plants reach the required size and flowering stage for the market within a predictable timeframe. Accurately scheduling a crop's harvesting time is especially crucial when planning to have the new plants ready for presentation and sale at special events or during seasonal market cycles, particularly in the spring and autumn.

All the listed production and handling aspects of ornamental plants were found to be very important to growers when selecting a new plant variety for commercial production. Growers assigned the following ratings to the five selection criteria covered in this part of the survey: (i) regular growth forms to ensure ease of handling and standardisation (91.4%); (ii) ease of transporting the product (84.7%); (iii) short crop turnover and production times (84.2%); (iv) ability to grow and supply the plants during all seasons (79.3%). Scheduling crop readiness for market events was found to be the least significant concern (61.8%), compared to the other listed criteria.

Production and handling procedures may vary considerably among individual growers, which is confirmed by the following comment by a grower:

Production and handling and market and economic considerations vary

according to the grower. Specialist growers are geared for their specific crop type which may not always be regular growth forms.

Most growers have adapted their handling and transport systems to match the robustness or fragility of their plants. Sturdy growth forms, such as woody plants, are easier to handle and transport than large succulents such as *Aloe* and *Euphorbia* species. The latter types of plants may easily suffer breakages when being moved owing to their “soft” structures.

5.5.3 Discussion of the findings regarding growers’ needs in respect of the marketing and other economic aspects of ornamental plants

Consumer tastes in ornamental plants are usually driven by fashion trends which can be difficult to predict as they change constantly (Cadic & Widehem, 2001:77; Segers, 2001:16). It sometimes happens that by the time a new, fashion-oriented product enters the market, the particular trend which inspired its cultivation may have blown over and consumers may have lost interest in that product. This is all the more likely to occur in cases of long-term breeding programmes designed to improve certain plant characteristics and which may stretch over several years, because by the time the crop is ready for the market, consumer tastes may have changed.

Both sources point out that market acceptance of a crop of new plants can never be guaranteed, no matter how highly a grower may think of his or her own product.

According to Armitage (1998:251), research programmes involving horticultural criteria for ornamental plants usually focus on the growth sectors in the market. He, too, concludes that industry acceptance of new crops is never guaranteed and that market penetration by new plants is especially difficult in well-established product sectors, such as the flowering pot plant market.

Segers (2001:15) observes that the relatively small number of plants sold per successful cultivar often results in relatively high input costs per unit which are, *inter alia*, necessary to cover the cost of the development work, breeder's licences and promotion. This author also believes that the relative short commercial life cycle of most cultivars can sometimes reduce a crop's overall profitability.

Segers (2001:15) suggests that greater variation is needed in respect of the breeding objectives for new plants, regarding for example, flower colour, shape and size, while maintaining cultivar uniformity, so as to improve their chances of becoming commercially viable.

He recommends that growers and breeders should set their cultivar breeding targets in one of two ways, either by concentrating on consumer needs or purely on achieving a healthy return on investment, although these two objectives remain interrelated.

Plant attributes that tend to help make growing them economically feasible include features such as low maintenance costs and high production yields of good quality plants throughout all seasons. The latest market trends, as reflected by consumers' preferences, should naturally be taken into account when choosing which cultivars to grow. Cultivars grown primarily to satisfy particular fashion trends are, however, bound to have a relatively shorter commercial lifespan than those of the more established assortments (Segers, 2001:16).

This study has confirmed that growers regard as of the utmost importance all the marketing and economic considerations related to the choice of new ornamental plants for commercial production contained in the survey. The combined ratings allocated by growers to the survey's menu of possible

selection criteria are as follows: (i) market acceptance of the new product (96.6%); (ii) the market potential of the new product (93.1%); (iii) a decent commercial lifespan (91.4%); (iv) plants delivering high yields at low production and maintenance costs (82.5%) and (v) reasonable market introduction and promotion costs (72.4%)

This section attracted the highest number of additional comments from respondents. The gist of these responses suggests that there is a great need among growers for more extensive research into the market potential of indigenous ornamentals in this country. Growers also require more up-to-date information about the latest market developments. Some of their insightful comments are reproduced below:

The success of the grower and indigenous plants on the market is all about marketing and service.

Growers need market information on what is accepted in the market and the market potential of new crops in order to grow plants that the market wants. There is a shortage of this type of information to growers.

Growers experience a great need of knowledge and information on the consumer market.

There are many plants available in the South African flora, but the market is specific in its needs and growers need to know what these are.

Growers should not grow something the market is not interested in, and therefore not accepted in the market, but don't always have the knowledge of this.

Growers need market information on the potential of new crops.

As plant brokers we feel the largest limiting factor on the availability of indigenous plants, is the lack of quantities available which could be as a result of an overwhelming need for indigenous plants and insufficient supply by the growers. This could be because the grower's lack of knowledge as far as the demand for the material concerns, crop failures due to growers limited knowledge of the propagation and cultivation requirements of these plants and that there is limited propagation material (mother plants).

5.5.4 Discussion of the findings regarding growers' expectations in respect of the propagation aspects of ornamental plants

Cultivation techniques commonly employed by growers include the use of greenhouses, substrate cultivation and tissue culture (Segers, 2001:17). Vegetative methods (cuttings or division of plants) and seed are the most popular means of propagating outdoor plants. Armitage (1998:254) elected only to use material propagated by vegetative means for his research programme, and recommended that researchers and growers should rely on propagation by seed only if no vegetative material is available. Based on his trials, Armitage (1998:254) came to the conclusion that when attempts to propagate a particular plant became overly difficult and if no clone material was obtainable, then one should consider eliminating that plant from one's research altogether.

The survey testing the relative importance of the key propagation issues put up for rating by growers, turned out the following results: (i) every single respondent highlighted the importance of the reliability and consistency of whatever propagation method was used (100%); (ii) a great many preferred using both seed and vegetative means of propagation (84.7%); nonetheless, if compelled to choose between vegetative means or propagation by seed, then (iii) vegetative methods emerged as the clear favourite among growers (78.2%),

in contrast to (iv) those opting to use seed only (57.1%); (v) although still important, cultivation by means of clone material was rated as a somewhat lesser consideration (59.6%) relative to the others, while (vi) respondents ranked the importance of tissue culture cultivation at the bottom of list (33.6%).

5.5.5 Discussion of the findings regarding the minimum period of good garden performance growers expect from horticultural crops

Armitage (1998:254) found that new ornamental plants of any growth form should produce at least 12 weeks of good garden performance in order to be retained as part of standard research and development programmes.

In South Africa only annual plants are usually expected to produce good garden performance over a minimum period of 12 weeks. In the case of all other horticultural plant varieties, good garden performance is expected to last for more than 16 weeks.

5.5.6 Discussion of the findings regarding the maximum production time and crop turnover growers expect from horticultural crops

Crop turnover is important in the market. Plants that grow and flower quickly are more likely to be adopted by industry than those that require more protracted time periods (Armitage, 1998:252). He set the optimal production time from the start of propagation up to the plant's reaching its ready-for-market growth stage at no more than 12 weeks.

Growers in South Africa generally expect the maximum production and crop turnover time for ornamental plants to last no longer than 8 weeks for annuals, 12 weeks for herbaceous perennials and over 16 weeks for all other horticultural groups.

Comments from indigenous plant growers suggest that production time and crop

turnover also depend on the species, not necessarily the horticultural category, and that there may therefore be a lot of variation within the groups. Owing to the slow growth rate of many indigenous plants, some species may take several years to mature before being ready for the market, but could then fetch a good price.

5.5.7 Discussion of the findings regarding the ease or difficulty of domesticating wild plants

Wilkins & Erwin (1998:81-82) state that production development involving domestication of wild plants entails the collection, identification, selection and breeding of a crop under various environmental conditions. Production development usually entails basic and applied research related to flowering physiology and cultivating requirements necessary for growth (nutrition, light, temperature, water, and pest and disease control).

According to Johnston & Webber (1998:106), attempts to domesticate many species of wild plants may not always meet with success. The process of domestication is seen as a three-phase process of (a) initial biological and ecological studies, (b) an investigation to discover the most effective propagation methods and (c) a selection process to match plants to the planned horticultural use of a species, either prior to propagation or, if necessary, after propagation has been resolved.

Powrie (1998:2) also comes to the conclusion that while some South African plants may indeed be easy to propagate and hybridise, the majority of indigenous plants are not easy to grow. She states that ongoing horticultural research programmes and trials at South Africa's National Botanical Gardens will be necessary to ensure a steady flow of exciting new introductions to the horticultural industry in South Africa and abroad, now and in the future. According to her, the efforts of horticulturists are rapidly expanding the

knowledge base and cultivation guidelines on the more than 2 200 species that have already been researched (though only constituting approximately 10% of all known South African flora). This means that relatively few plants from this vast wealth of flora are currently being cultivated. Powrie (1998:4), finally observes that many of the new plants she listed in her work “Grow South African Plants” are fairly new to cultivation and have not yet been extensively tried in a wide range of climatic conditions.

The survey confirmed that the domestication of indigenous wild plants was found to be difficult in general. The most difficult questions proved to be (i) the determination of cultivation requirements (71.4%), while (ii) the least difficult was the identification of the plants (50.9%). Participating growers were also asked to rate a number of additional potential problem areas in domesticating wild plants according to their perceived degrees of difficulty. The items and difficulty ratings were thus: (iii) achieving improvements to the plant (66.7%); (iv) obtaining biological studies of the plant (flowering time, pollination) (64.9%); (v) selecting horticultural superior forms of the plant, the so-called elite types (62.5%); (vi) accessing plant material from its natural habitat (61.4%), and (vii) determining the most appropriate propagation methods (58.9%).

Growers noted that the success rate of domesticating wild plants and selecting horticultural superior plant forms depended on the individual species and could vary from easy to difficult.

Respondents commented that obtaining permits for collecting plant material for propagation purposes was often very difficult and frustrating. The selection of horticultural superior forms and taking measures for effecting improvements to plants were considered relatively easy in the case of many species, but could sometimes be time-consuming and require a lot of space for cultivation. Respondents furthermore noted that funding for sourcing, research and development of indigenous plants for horticultural use was scarce.

5.5.8 Conclusions regarding growers' needs in respect of ornamental plants

5.5.8.1 Conclusions regarding growers' needs in respect of the quality aspects of ornamental plants

It can be concluded that all the listed quality aspects of ornamental plants are of the utmost importance to growers and should continue to be used as selection criteria.

5.5.8.2 Conclusions regarding growers' needs in respect of the production and handling aspects of ornamental plants

Regular growth patterns of plants are very important to ensure product standardisation, ease of handling and transport. However, comments by respondents indicated a high degree of specialisation in terms of crop type and products amongst growers. These specialised types of crops often do not display the regular growth patterns found in other plants, nor are they easy to transport and thus require special handling and transport methods. Large trees and succulents, for example, are two of these speciality crop types that require special transport and handling.

5.5.8.3 Conclusions about growers needs in respect of marketing and economic aspects of ornamental plants

All the listed marketing and economic considerations in the production of ornamental plants were found to be of paramount importance to growers and constitute a significant part of growers' selection criteria when choosing new plants for commercial production.

The growers also expressed a great need for up-to-date market information, particularly about consumers' needs and the potential size of the market.

5.5.8.4 Conclusions about growers' expectations in respect of the propagation aspects of ornamental plants

Of the 138 questions contained in the survey of ornamental plant growers, the responses to only one question produced a 100% agreement rate as to importance, namely the one about the reliability and consistency of propagation methods. While most growers use both seed and vegetative propagation methods, the latter is by far the most commonly used.

5.5.8.5 Conclusions about growers' expectations in respect of the minimum period of good garden performance of horticultural crops

In South Africa annuals are expected to produce good garden performance for at least 12 weeks, whereas in the case of all other horticultural groups this period should last for more than 16 weeks. The long growing season is mainly due to the geographical locations of the main cultivation centres in South Africa.

5.5.8.6 Conclusions about growers' expectations in respect of the maximum production time and crop turnover of horticultural crops

The maximum production and crop turnover time for ornamental plants in South Africa is expected to be no more than eight weeks for annuals, 12 weeks for herbaceous perennials and more than 16 weeks for all other horticultural groups.

However, production time and crop turnover also depend on the species, not the horticultural category, and therefore there may be a lot of variation within the horticultural groups.

The slow growth rate of many indigenous plants results in very long production times which, in turn, increases production costs.

5.5.8.7 Conclusions about growers' experience of the ease or difficulty of domesticating wild plants

Domesticating wild plants was found to be difficult in general. It can be concluded that the domestication of wild plants is a restraining factor in the utilisation of indigenous plants for horticultural purposes. The domestication of wild plants and selection of horticultural superior forms of plants depend on the species and can vary from difficult in some instances to relatively easy in others while determining the propagation methods and cultivation requirements of some species could be easier.

5.5.9 Caveat concerning recommendations and expert input regarding selection criteria to address growers' needs

Since this study does not purport to set any environmental, technical or commercial specifications as clearly stated in the research scope delimitations, and since this researcher is herself not an expert on horticulture, no specific recommendations regarding selection criteria important to growers can be made.

Nonetheless, this study does contain the input of leading growers who, as recognised experts in their field, are in a commanding position to suggest appropriate guidelines and make recommendations best suited to their particular segment of the industry. The author therefore believes that the collection of expert input embodied in these results would be quite useful to researchers, marketers and retailers, landscaping and gardening practitioners across the horticulture industry, including even some growers themselves.

It is against the backdrop of the foregoing considerations that a summary of the results of this part of the investigation is included as selection criteria important to growers (See also Section 4.4.11 of Chapter 4 for a summary of the survey results on growers' selection criteria).

5.5.10 Conclusion regarding Hypothesis 1

In the foregoing section Hypothesis 1 was examined which postulated that appropriate selection criteria can be formulated to meet the needs of consumers when deciding to purchase new plants. Hypothesis 1 also assumed that selection criteria can be formulated to meet the needs of growers when making decisions at the onset of research programmes for developing new horticultural crops, or when sourcing new plants from the wild. In this section the researcher has produced sufficient evidence to confirm the validity of Hypothesis 1.

5.6 Industry trends and market possibilities

This area of the investigation covered trends in the industry related to the horticultural use of indigenous plants in South Africa, as well as new marketing opportunities. The survey results have been used to demonstrate the market possibilities for the horticultural use of indigenous plants. The data have also been used to provide answers to the second sub-problem.

Although the research is confined to indigenous ornamental plants used for outdoor gardening and landscaping, this section includes references to indoor plants and utilitarian plants, such as food and medicinal plants, where appropriate.

The author adopted a more flexible approach in interpreting the survey results

of this part of the study which may appear to some to be academically less rigorous than might have been the case otherwise. This method is nevertheless firmly founded on a number of compelling, knowledge-based considerations, to wit (a) the researcher's own academic background in taxonomic botany, (b) her enthusiastic, lifelong interest in ornamental horticulture, (c) her keen engagement with the horticulture industry over many years, dating back to 1983, and (d) the many edifying practical experiences gained from it.

Sub-problem 2

Establishing whether growers and breeders of indigenous plants for horticultural use are responding adequately to meet new market opportunities caused by changing trends in the horticulture industry.

This sub-problem statement led to the second hypothesis, namely:

Hypothesis 2

It is postulated that the extent of the untapped market potential for horticultural applications of indigenous flora in South Africa is large enough to warrant the introduction of new indigenous and new special-purpose plants to the market.

This hypothesis will be examined in the next section and evidence will be offered to prove or disprove it.

The discussion of industry trends of ornamental plants and market possibilities for indigenous plants which appears in the next section will be followed by an account of the findings related to those horticultural groups of ornamental plants that are important in the industry; the conclusions reached; and the subsequent recommendations. (See also Section 4.4.9 of Chapter 4 for a

summary of the survey results on industry trends and market possibilities for indigenous plants.)

5.6.1 Discussion of the findings regarding the industry trends and market possibilities for indigenous plants

Van der Spuy (1967:209) points out that the demand for indigenous plants in South Africa declined so dramatically just before and during the 1960s that very few nurseries found it profitable to stock them. During that period gardening with exotic plants became all the rage. Gradually, however, public interest in indigenous plants as garden subjects was steadily revived, mainly owing to their proven hardiness in surviving the inescapable, cyclical occurrences of droughts in South Africa. As a result, consumers came to realise that indigenous plants could far better survive these often severe climatic iterations than their exotic counterparts.

According to this researcher's own observations, the horticultural use of indigenous flora increased significantly in subsequent years, promoted in no small part by the introduction of television in 1976. During the latter part of the 1970s and in the 1980s, South African Television broadcast several popular nature programmes, hosted by renowned botanists, and which included segments about our indigenous plants. During this period other media carried similar features on the use and benefits of indigenous flora in landscaping and gardening. At the time this surge in media attention triggered a remarkable renewal of consumer interest in these types of plants, the effects of which are still evident today.

The staggering diversity of plant species and cultivars is a hallmark of the modern day horticulture industry in South Africa and the world over. More ornamental plant species are under cultivation today than the combined total of all the other agricultural and horticultural crops in production (Halevy, 1999:407

and Brickell, 2001:160). This astounding fact is highlighted by the research which Glen (2002:i) undertook in which he compiled a database of almost 9 000 varieties of plants known to have been successfully cultivated in South Africa or which have already been subjected to cultivation attempts.

Utilitarian plants form a considerable part of the overall horticultural trade. In South Africa, gardens of people from all cultural groups, including those from indigenous cultures in urban and rural areas, make use of several indigenous and exotic plant species to provide one form of protection or another such as hedges, windbreaks and shade trees (Molebatsi *et al.* 2010:2952 and Coetzee *et al.* 2007). Research by Lubbe *et al.* (2010:2900) also found that the gardens of lower income households tended to contain higher proportions of utilitarian plants, such as food and medicinal plants, than gardens in more affluent areas.

Halevy (1999:407) argues that introducing new indigenous ornamentals to the market may be easier than new local edible plants, because the potential nutritional value or poisonous properties of the latter are seldom of any real concern to consumers in the formal sector of the economy.

The findings of this study, however, suggest that Halevy's observation may only be true to a limited degree. Indeed, the extent of the public's knowledge of indigenous plants appears to be increasing steadily, although not always or everywhere at the same pace. The comparatively high levels of present day awareness of the various characteristics of indigenous plants mean that many consumers are becoming alerted to both the beneficial and harmful properties of such plants, e.g. whether poisonous, innocuous, practical or even edible. This trend suggests that an increasing number of people seem to know which indigenous plants produce sustenance and shelter for humans and animals and are thus of some economic utility; which plants can ideally complement the modern, health-conscious, environmentally-mindful lifestyles of people wishing

to grow their own herbs, food and medicinal plants; or which plants may be enjoyed simply for their aesthetic and other qualities as ornamentals. One is also reminded that a great number of South Africans are the custodians of a vast body of indigenous knowledge about the practical uses of local plants in traditional ways of living, established over hundreds of years.

Notwithstanding the huge diversity of indigenous plants on offer in the trade, this survey has revealed shortages of varying severity occurring in the market from time to time. Competition by some of the more popular exotic varieties may play a telling part in causing such shortages. These shortages arise in respect of several growth forms, and special-purpose plants.

Product specialisation could be further reason for these reported shortages. Some growers and retailers who participated in the survey run specialised businesses concentrating on certain grow forms (e.g. trees) and may therefore not normally carry a wider assortment, such as shrubs, bulbs or seedlings. The survey results show that over 10% of grower and retail respondents selected the “don’t know” option in answering the question whether they had experienced a lack of variety in the specified groups of plants.

On the other hand, the survey did show that 25.7% of respondents often, or very often, experienced a shortage of indigenous trees in the market. This implies that roughly one in four potential customers seeking indigenous trees is bound to be disappointed by the product ranges on offer, whether they be ordinary gardeners or landscapers having specified particular types of indigenous trees for their projects. The size of this shortfall is large enough to justify horticulture practitioners paying further attention to the problem, above all those involved in plant production, supply, marketing and retail operations.

The survey pinpointed the one area in which consumers experienced the highest incidences of market shortages, namely indigenous annuals (66.1%).

The following remark by a garden centre representative illustrates the point:

“We very often experience a lack of variety in indigenous annuals. The old well-known indigenous plants such as *Lobelia* and *Gazania* are mostly available, with a few recently introduced new cultivars of *Nemesia*.”

Annuals are usually sold as seedlings, bedding plants and seed. Seedling sections of nurseries are usually ablaze with colourful flowers and are invariably dominated by a few well-established product lines, with new exotic cultivars from international breeders regularly making their market debut.

On the other hand, South African flora can boast a rich endowment of annuals, such as the plants responsible for the spectacular spring flowering in Namaqualand. These types of plants could possibly provide more specimens of indigenous annuals for commercial production.

Survey respondents indicated that there was a considerable shortage of indigenous climbers in the market (59.8%). This growth form is typically found in areas of forest vegetation. Since this biome type occurs in only a very small part of our country, climber supplies harvested from this source for the market may be limited.

Indigenous aquatic plants (55.9%) and ferns and foliage plants (55.7%) are in fairly short supply in the market. These plant groups are particularly popular among certain consumers as they match certain fashion trends, such as use in water features or in lifestyle-complementing environments created indoors under low light conditions. A spokesperson for a garden centre remarked that:

“We often experience a lack of aquatic plants since water features have become popular additions to homes and gardens and customers ask for suitable plants for these water gardens.”

There is also a market shortage of indigenous grasses and grass-like plants (54.6%). Considering that the Grassland Biome covers a substantial part of our country, including the relatively cool Highveld, this group holds the potential of providing some new plant types for commercial exploitation. Most members of the large Poaceae family of grasses are unfortunately rather unattractive and their successful commercialisation would require careful selection and breeding. Other attractive grass-like families with greater market potential as ornamental plants are the Restionaceae (Cape restios) and Cyperaceae (sedges) of which several restios have successfully been launched into the market over the past 10 years or so. Sedges are particularly well-suited for wet habitats like water features.

Curiosity plants (52.2%) are a group which needs closer attention by the horticulture industry, as there seem to be a growing interest in them. The South African flora can provide many examples of such plants, especially succulent growth forms. These kinds of plants are often treated as collectibles and are mainly kept as small indoor pot plants, as specimens or accent patio pot plants.

Fewer than 50% of respondents indicated that they had often, or very often, experienced a lack of variety of indigenous herbaceous perennials (49.5%). These plants usually produce colourful flowers which may account for their apparent popularity among consumers. Refer also to the following comment by a garden centre representative:

“We very often experience a lack of variety in indigenous herbaceous perennials, which are also important colour providing plants. New *Pentas* cultivars and species such as *Gomphostigma*, *Osteospermum* and *Euryops* are becoming available now.”

Both Cape flora and indigenous shrubs seem to be reasonably well supplied, but even so, 38% of respondents often, or very often, experienced a lack of variety in these groups. Comments from participants stated although there was a demand for Cape flora in the other regions of the country, new climatically adapted cultivars were entering the market. Some of our indigenous shrubs probably need some improvement from breeding efforts, as they often appear to be somewhat 'untidy' in appearance.

Shortages were found to be less severe in the well-known traditional garden plant groups, such as succulents (36.2%), groundcovers (35.7%) and bulbs (31.2%). Bulbs from the winter rainfall areas of the country have been on the market for many years, but bulbs from the summer rainfall areas are only starting to make their appearance now.

Trees are the best supplied group on the market. Nevertheless 25.7% of respondents still experienced a lack of variety in indigenous trees. Trees are the largest growth form among indigenous plants, the most expensive, and make the biggest impact on and difference to any landscape. There is a rich natural variety of wild trees in the South African flora and this would probably be the first group that could attain near saturation levels in market supply in future.

As far as the availability of special-purpose indigenous plants is concerned, indoor plants achieved the highest score with 72.1%. This finding ties in with the modern lifestyle of people spending more time indoors at home or in the workplace. These environments require plants adapted to low light conditions. A number of respondents remarked that there was a shortage in indigenous plants for large indoor areas, e.g. office blocks, shopping malls and hotels. The shortage of large indigenous indoor plants is made more acute by the market dominance of well-established pot plants.

Colourful plants (61.7%) are the second most important category for new introductions to the market, which explains the high score assigned to annuals (66.1%) in the growth form section. Participants commented that colour-providing plants in general were important in the consumer market and that many consumers often thought of indigenous plants as only being fit for providing greenery.

There is a demand for shade plants (which had a score of 58.8%), and for cold-hardy plants (54.9%) in several growth forms in the cold parts of the country.

The scores assigned to collectibles (47.8%) and outdoor container plants (46.2%) suggest that the market potential of these groups should be further investigated. Consumers' attitudes towards these types of plants are aptly reflected by following comment by a representative of a garden centre:

“The garden centre customer is not really a collector, and is happy with *Cycas* species or one of the cheaper more common *Encephalartos* species. There is a growing interest however in succulents and curiosity plants for outside gardens as well as pot plants of different sizes, especially small pots for indoors and fashionable patio pots.”

Accent plants (40.9%), fillers (39.2%) and plants for erosion control and soil stabilization (35.9%) are utility groups used predominantly in landscaping.

Landscapers are among the leading opinion-makers and fashion trendsetters in the horticulture industry. Nonetheless, their sector of the industry does not always seem to be as well served by growers and research institutions as it should be. This apparent lack of support and the want of more mutually-supportive interaction between these industry role-players, as observed by this researcher, may perhaps best be illustrated by the following comments from

survey participants:

A landscape contractor:

Although the market is well supplied in indigenous fillers, it is always just the same boring plant choices e.g. Tulbaghia, Bulbine, Dietes, Agapanthus and Gazania, there is definitively not enough variety in this group

A large grower:

We rarely experience a lack of variety in indigenous fillers and the market is well supplied by dependable relatively cheap plants. Several new cultivars of Agapanthus started to come onto the market during the past few years, and there are probably more to come from the breeders.

There seems to be a need for the introduction of new indigenous plants as hedges (39.8%). Some of the 'untidy' growth forms may even find useful application in this category. Several of the commonly used exotic plants, such as *Pyracantha* species, have become invasive and need to be replaced (according to 37% of respondents). In this case one could consider indigenous substitutes, especially in the colder areas of the country. See also below the illuminating remarks by a representative of a garden centre:

"We often experience a shortage in plants for hedges as the security situation has become of great concern to all population groups. Privacy is also becoming more important, and plants are more attractive than concrete walls, and also have other benefits. However, some of the plants suggested by indigenous growers e.g. *Maytenus* species are foul smelling when in flower."

Although drought-resistant plants are one of the better supplied indigenous plant groups in the market, as many as 28.4% of respondents reported that they had experienced a lack of variety of such indigenous plants in the market.

5.6.1.1 Edible indigenous plants

The large percentages of “don’t know” responses recorded in this section is significant, because these may indicate the extent of consumers’ lack awareness of edible indigenous plants.

The introduction of more edible indigenous plants should be further explored by the formal, commercially-based horticulture industry.

Nevertheless, there seem to be a healthy consumer interest in this group of plants, especially in indigenous fruit trees, in which case 57.1% of respondents often, or very often, experienced a lack of variety (12% of respondents didn’t know).

Respondents showed an interest in indigenous culinary herbs and 51.1% of them reported that they had experienced a lack of variety in this group, while 17.6% said they “didn’t know”. Related category results indicated that 47% of respondents had experienced a lack of variety in indigenous vegetable seedlings (21.5% did not know), while 42.3% had similar experiences in regard to indigenous medicinal plants (20.9% did not know). Some of the participants’ comments may shed some light on the uses of this plant group:

Indigenous plant growers:

The interest in indigenous medicinal plants is debatable and it is a topic of political sensitivity.

There are no indigenous vegetables in South Africa.

We often experience a lack of variety in indigenous fruit trees in the market.

Representatives of garden centres:

Some well-known species such as Marula is sometimes asked for by customers, but these are very climate specific species and not available in our area.

Consumers never ask for indigenous edible plants, they prefer the well-known kinds of fruit trees, vegetables and herbs. Indigenous fruit, vegetables and herbs are an unknown concept to most of them.

5.6.2 Conclusions and recommendations related to the market possibilities for indigenous plants

5.6.2.1 Cold-hardy plants

The largest market for plants in South Africa is in the Gauteng province, which includes the Highveld area with cold winters. A large number of growers (69.5%) indicated that there was a lack of cold-hardy ornamental plants among South Africa's flora.

According to respondents' comments, climate is one of the most important factors inhibiting the more widespread use of indigenous plants in South Africa. Low temperatures (frost between 0° and -10° C) limit the use of many of the most attractive indigenous plants and growers experience a shortage of indigenous plants in several growth forms in areas that are particularly susceptible to cold weather during the winter months. It is recommended that plant breeders and growers should try to cultivate indigenous plants that have been successfully adapted physiologically for use in climatic zones other than those from they originate (e.g. cold-hardy plants, Cape flora for use in summer rainfall areas), rather than concentrating on morphological improvements only (e.g. larger flowers).

5.6.2.2 New species and cultivars are needed across the whole spectrum of indigenous growth forms

There remains a need in the market for new species and cultivars across the whole spectrum of horticultural groups. Comments by landscapers suggest a measure of tedium prevailing in the market in respect of well-supplied groups, such as trees, fillers and groundcovers. New species and improved cultivars are also needed in these groups.

5.6.2.3 Succulents and curiosity plants

Comments from retailers point to a growing interest amongst customers in succulents and curiosity plants of all sizes for outside gardens, as well as for large patio pots and small indoor pots.

5.6.2.4 Indoor plants

The indoor plant market is dominated by well-known exotic plants such as the aroids. The shortage in indigenous plants for the greening of indoor areas could be addressed by the innovative use of existing plants for new purposes or new locations (e.g. by using young forest trees as indoor plants).

5.6.2.5 Plant specifications and information

There is a lack of information on specific species which may be employed for special-purposes, such as upright plants standing in shade and/or badly drained soil. There also is a market demand for indigenous plants which are adapted to different soil types, the western summer sun, and plants which can tolerate wind and the absence of sunshine during winter. In addition, plants matching the scale of modern buildings are needed (e.g. narrow plants for narrow spaces).

Consumers often find it difficult to communicate their needs to plant and gardening experts, such as landscapers: for instance, private clients and developers often specify a preference for indigenous plants, but they have no proper knowledge of such plants and they are usually unable to name the indigenous plants they require.

5.6.2.6 Edible indigenous plants

Although consumers almost never enquire about edible indigenous plants as such, there is growing interest in edible ornamental plants in general. Consumers seem to be generally oblivious about indigenous fruit, vegetables and herbs, which suggests that there is a need for consumer information about this group of plants.

5.6.3 Conclusion regarding Hypothesis 2

This study's findings and conclusions on industry trends and market possibilities for indigenous plants in South Africa confirm the validity the second hypothesis, namely that the extent of unexplored market possibilities is large enough to warrant the introduction of further growth forms of indigenous plants, special-purpose indigenous plants and indigenous edible plants to the market, in addition to existing plant varieties.

5.7 Competition and limitations to the utilisation of indigenous plants for horticultural purposes in South Africa

This area of the investigation covered competition by other exotic plant varieties and species inhibiting the more widespread use of indigenous plants in horticultural applications in South Africa, as well as other related restraining factors.

The data were also used to provide answers to the third sub-problem:

Sub-problem 3

Identifying the restraining factors inhibiting a more extensive use of indigenous South African flora in horticultural applications, such as, for instance, the competition they face from exotic plants.

Hypothesis 3

It is postulated that a number of restraining factors are inhibiting a more widespread use of South African indigenous flora in horticultural applications, such as, for instance, competition from exotic plants, resulting in the underutilisation of indigenous plants, and, furthermore, that this apparent underutilisation is of a sufficient magnitude to warrant a comprehensive investigation in order to find means of possibly ameliorating the status quo.

This hypothesis will be examined in the next section and evidence will be offered to prove or disprove it.

The discussion of the question of competition and the limitations to the utilisation of indigenous plants for horticultural purposes in South Africa which appears in the next section will be followed by a discussion of the findings related to those factors that may limit the use of indigenous plants; and the consequent recommendations.

5.7.1 Discussion of the findings related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa.

Over the years, a great many plants from South Africa have made their way into countless gardens abroad. So, too, has a plethora of plants been

imported from other parts of the world for cultivation over here: many exotic species and cultivars have indeed become well-established and highly popular features of the South African horticulture industry.

The commanding market position which many exotic ornamentals enjoy consequently sets a steep hurdle for the potential commercial success of any new plants grown from native stock (Armitage, 1998:252).

The poor endowment of South African flora in respect of the some of the popular exotic plant groups in circulation today has no doubt helped the latter to achieve its ascendancy in the market. For example, palms and tropical rainforest understory plants, such as Aroids, are among some of the world's most sought-after ornamental plant types, both for outdoor landscaping, as well as indoor pot plants. Coniferous plants are commonly employed in all sorts of horticultural applications, but of which there is only a small number native to South Africa, like the Mountain-cedar *Widdringtonia nodiflora*. Likewise, few members of the Rosaceae family count among our indigenous flora (although of global range, many conifers and Rosaceae members are found in the temperate northern hemisphere and are known for their low temperature tolerance). Our patrimony of indigenous flora thus simply does not contain ornamental plants that can compete as plausible substitutes with many of the more popular exotic horticultural groups.

Confirming this long-standing trend, Lubbe *et al.* (2010: 2907) observe that exotic plants are extensively used in gardens all over the country, including those of all cultural and income groups.

Crops of new plant varieties are regularly needed to encourage economic growth in the horticulture industry and particular fashion trends are sometimes created on purpose to stimulate demand. These endeavours are usually preceded by ornamental plant prospectors doing extensive research and

literature surveys on genera that could possibly be exploited in this cause (Kim & Ohkawa, 2001:179). Many parts of the world outside South Africa, too, can boast a bounty in diversity and abundance of endemic native flora. Van Wyk & Smith (2001:5) demonstrate the impressive extent of these natural treasure troves across the globe by noting, for instance, that China, Mexico, Papua New Guinea, the continental USA and Venezuela are each home to over 20 000 plant species, while more than 50 000 species are to be found in Brazil and Colombia.

Harris *et al.* (2000:191) hold that New Zealand is another excellent source of new plants destined for consumers in the northern hemisphere, because of its unique and interesting flora and because of its climatic similarities with the northern hemisphere. Australia, too, has long been acknowledged for its distinctive and diverse flora, many examples of which are perfectly suitable for use as ornamental plants (Slater *et al.* 1998:103 and Blackwell, 1998:263).

Many countries are thus purposefully searching for new horticultural products. Countries like China and others in Asia, which had formerly been closed to the rest of the world for political or geographic reasons, have now opened up to a flourishing international trade. Not only do these territories possess their own notable resources of exciting plants, but they are also becoming important as large new producers of ornamental plants. Other noteworthy suppliers of new ornamentals for the global market are countries like Israel (Gilad *et al.* 2001:171) and Chile (Kim & Ohkawa, 2001:179), among others. The implication of these global developments is that South Africa, as a producer of horticultural products and as a source of new ornamentals, may be up against stiffening competition from abroad.

The survey results confirm that there are a number of factors which limit, to a greater or lesser extent, the use of indigenous plants in South Africa. The greatest such factor is the lack of suitable indigenous plants to substitute the

more popular exotic horticultural plant varieties (82.1% of respondents concurred with this statement).

The increased availability of exotic ornamental plants (73.6%), coupled with the arrival on the market of new exotic varieties (70.2%), is a further limiting factor. Other, more moderately important limiting factors include market saturation (62.5%) and the market dominance (61.4%) by certain exotic plant groups.

Interestingly enough, experts participating in the survey believe that plant imports from countries with high degrees of botanical diversity are the least important limiting factor to the horticultural use of indigenous plants in South Africa (41%).

5.7.2 Conclusions related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa

The greatest limiting factor is the general lack of suitable plants among our indigenous flora that can be used as substitutes for some of the main popular horticultural plant groups (e.g. roses, palms, conifers). These popular plants also dominate the ornamental plant industry the world over. The extent to which indigenous plants can be adapted to match the characteristics of such popular plants (e.g. attractive shape, flowers, cold-hardiness) will, to a large degree, determine whether they will find a more widespread appeal in the ornamental plant market.

Competition from exotic plants for market share should be seen as a normal and healthy feature of the industry. Problems related to market dominance and saturation can be overcome by sourcing new indigenous plants for horticultural use in the groups offering the most promising market potential as identified in Section 5.4.

5.7.3 Recommendations related to factors limiting the utilisation of indigenous plants for horticultural purposes in South Africa

5.7.3.1 Student training

Training institutions should impart expert knowledge on indigenous plants to students studying horticulture and landscape architecture. More specialised training on indigenous plants suitable for each climatic region in the country should also be offered.

5.7.3.2 Promotion of indigenous plants amongst all population groups in South Africa

The benefits and use of indigenous plants should be promoted among all population groups of South Africa, especially by pointing out how these plants could appeal to and enhance their particular lifestyles.

5.7.3.3 Greater exploration of overseas markets

Overseas markets present a huge export potential for South African flora which should be exploited in greater depth.

5.8 The sources for new ornamental plants in South Africa

This area of investigation covered the local sources for new ornamental plants. A discussion of the findings related to the sources for new ornamental plants; the conclusions reached and the ensuing recommendations will appear in the next section.

5.8.1 Discussion of the findings related to the sources for new ornamental plants in South Africa

According to Brickell (2001:160), past horticultural practices often entailed people transplanting large numbers of plants from the wild for use in gardens, without considering the harmful impact of their actions on the environment. While preceding horticulture practitioners may be forgiven for their sins unknowingly committed, such behaviour ought to be out of the question nowadays, because modern man has a far more acute appreciation of the devastating multiplier effects that can be wrought upon our fragile ecology by the uncontrolled, unwise and wanton removal of living plants from their natural habitats.

Countries' sovereign rights over their own natural genetic resources were formally recognised for the first time in international law by the Convention on Biological Diversity (CBD), entered into by UN member states at the 1992 United Nations Convention on Environment and Development (UNCED) in Rio de Janeiro, Brazil. According to Brickell (2001:162), the provisions of this Convention, while advantageous in many respects, may have a significant impact on plant breeding and the use of genetic plant resources across the world. He is of the opinion that the introduction of new plants may in some cases become much delayed, pending now lengthy procedures in obtaining official clearance from state authorities to collect propagating material from the wild. These new controls may thus limit the sourcing of plant material from those countries rich in biodiversity wishing to preserve their natural heritage, as well as those aiming to capitalise on the commercial exploitation of their plant resources (Brickell, 2001:162).

However, some authors, such as Brits *et al.* (2001:165), argue that relatively few species with exploitable commercial potential remain in the wild, and the notion that South Africa could substantially increase its national prosperity by

investing in extended development and breeding programmes of new plants, based on its indigenous floriculture, could therefore be little more than a utopian dream.

The South African National Biodiversity Institute (SANBI) and the nine National Botanical Gardens (NBGs) are acknowledged as the custodians of highly expert knowledge on the indigenous flora of this country (<http://www.sanbi.org.za>, accessed 28-05-2012). Our botanical gardens and specialised plant collections are recognized the world over as rich sources of plant material, some of which can potentially be used for the development of new ornamental crops (Halevy, 1999:408). With its world-renowned floral diversity, South Africa, and especially the National Botanical Gardens, of which Kirstenbosch is the most important, is regularly visited by horticulturists to source and collect plants (Eloff, 1987:125). According to Eloff (1987:125), a great advantage of the NBGs is that their horticulturists and supporters often venture into the field, enabling them to spot plants with exceptional qualities and to collect seed, cuttings or the plants themselves for testing.

Individuals, societies and small specialist nurseries often grow rare plants that are not commercially or widely available to the public. This happens when local growers take a keen interest in the uncommon types of indigenous plants which are likely to be found in their surrounding areas only. Unusual plant types cultivated in this isolated manner mostly tend to belong to categories such as herbaceous plants or succulents. These growers are potentially a hitherto largely untapped source of new plants.

Fashion is an important phenomenon in all areas of human life. Consumer tastes in ornamental plants are often driven by fashion trends which can be difficult to predict as they change constantly (Cadic & Widehem, 2001:77 and Segers, 2001:16). As with everything else, we sometimes see fashion revivals in the use of ornamental plants as well. The revival of interest in aloes,

combined with their ease of hybridisation, makes them ideal plants for commercial breeding programmes.

Old cultivars and heritage plants can be another source of breeding material for new plants. Brickell (2001:161) points out that historic gardens and the remains of old civilisations have been recognised the world over as important sources of archaic genetic plant material. He states that old and historic gardens have provided safe havens for many half-forgotten plant species over the world; several old cultivars and many other species would have died out had it not been for the survival of these gardens themselves.

Work done by Remotti (2002:179) has identified the declining genetic variability of some over-cultivated species as a major problem. Old, even archaic, plants having undergone genetic improvements over protracted stretches of time, and having been remarkably preserved in old or historic gardens, may provide the material of restoring genetic variability in some cases. Should, however, the plants remaining in such gardens be allowed to disappear, reconstructing their genetic composition for future use would be virtually impossible.

New applications for well-known garden plants can be found in some instances in ornamental horticulture. Certain types of garden and landscaping plants, mainly woody or herbaceous perennials, having for many years been used exclusively in gardens only, were recently successfully converted for use in other categories, such as cut flowers, pot plants, and pruned shapes (Middleton, 1998:77 and Halevy, 1999:408).

South Africa has several well-known garden plant species, but many of them have been overlooked as commercial prospects by our horticulture industry and research bodies. The genus *Plectranthus*, for example, has been known to horticulturists for a long time, but the first distinctive cultivars of flowering pot

plants of this genus were developed by a private breeder in South Africa only just over a decade ago (Brits *et al.* 2001:166).

New cultivars are a major source of new ornamental plants for the commercial trade today (Brickell, 2001:160). Some genera, for example herbaceous perennials, such as *Pelargonium* and *Gerbera*, have been the subject of intensive breeding and selection as ornamentals over many years and there is a bewildering choice of “novelties” flooding the market from which to choose.

The survey results revealed a number of sources that are being used for new ornamental plant introductions in South Africa.

The first finding is the confirmation that industry participants consider indigenous plants growing in the wild as the single most important source of new ornamental plants (91.5%).

Other potentially very important sources of new ornamental plants which growers rated highly were new cultivars of existing plants (84.5%), fashion revivals, and the reintroduction of previously neglected plants (both 84.2%), specialist nurseries (79.7%), botanical gardens and their companion nurseries (78.8%) and the renewed interest in heritage plants and old cultivars (72.9%).

Growers assigned a somewhat lesser value to collectors of unusual plants (58.6%) and to new applications for existing plants (57.9%) as potential sources of new ornamental plants for the future.

The results of the survey show that there are several potential sources of new indigenous ornamental plants, besides obtaining new plants from the wild. However, the existence of this large alternative “pool” of ornamental plants and the fact that some indigenous plants are now more readily available than before from other sources, may diminish the future importance of sourcing new

indigenous ornamental plants directly from the wild.

Based on the evidence produced for this section of the study, one can therefore conclude that the key assumption made at the start of the thesis, supposing that (i) new ornamental plants of both exotic and indigenous origin are being introduced to the South African market from time to time, and (ii) that this trend will continue for the foreseeable future, has been confirmed.

5.8.2 Caveat concerning the collection of wild plants in South Africa

Although this study expressly did not set out to develop any legal or environmental specifications (see the study's research scope delimitations), one should remember that the collection of plant material from the wild is regulated by law in our country.

South Africa and most other southern African countries are signatories to the International Convention on Biological Diversity and have legislation in force to protect their natural assets. It is therefore advisable that one should ascertain in advance the legal provisions governing the collection of wild plants from any given location, before gathering any material, such as, for example, the need to obtain the necessary permits and to comply with all other related legal requirements.

According to Victor, Koekemoer, Fish, Smithies & Mössmer (2004:14), permits are needed even for collecting unprotected taxa in South Africa, and special permission is required for threatened and protected taxa. For more information on South African biodiversity collection permits, the reader can access the following website:

<http://www.sanbi.org.za/information/infobases/collection-permits>

5.8.3 Conclusions related to the sources for new ornamental plants in South Africa

Growers continue to regard indigenous plants gathered from the wild as the most important source of new ornamental plants in the future, even though there are several other sources available. New plants from the wild are particularly important in providing plants to the market that are adapted to cope with specific climatic conditions and soil types.

New cultivars of existing species are another key source of new ornamental plants, especially if new varieties have improved horticultural performance properties.

5.8.4 Recommendations related to the sources for new ornamental plants in South Africa

There are many indigenous plants well known to botanists and horticulturists that are not freely available in the trade. These plants should be made available to the consumer and promoted in the media. The use of indigenous plants in South Africa can be enhanced through the reintroduction of old cultivars, improvements to previously neglected varieties, and through finding new innovative uses and locations for existing plants.

5.8.5 Conclusion regarding Hypothesis 3

The findings and conclusions stated in Section 5.5 confirms the hypothesis that the competition faced by indigenous South African flora in achieving a more widespread use in horticultural applications, together with other limitations, are contributing to their underutilisation. The problem is of such magnitude as to warrant more comprehensive investigation.

The scope of the researcher's research covered a number of salient aspects related to the potential of increasing the use of indigenous plants for ornamental purposes in this country. This study attempted, firstly, to identify those outstanding factors through conducting a comprehensive survey among role-players, and, secondly, to assign relative weightings to each of them to determine their importance by using quantitative research methods. (The scope of the research was explained in the Introduction to this Chapter in Section 5.1).

Nevertheless, the results of this study suggest that there may be scope for further research, as pointed out in the next section.

5.9 Recommendations for further research

As implied in the title of this dissertation, "*The determination of selection criteria for the horticultural use of indigenous plants in South Africa*", it concentrated on those issues directly related to the horticultural use of indigenous plants in South Africa. The survey results show significant variations in the responses to certain questions obtained from the various groups of respondents, particularly when compared with those offered by retailers and landscapers on the one hand; and those given by institutions involved in the growing of ornamental plants on the other. These variations suggest that there may be a need for further research into the field of promoting the use of indigenous plants for ornamental use. Such areas of future research may include the examples cited below.

5.9.1 Market research

Indigenous growers need more precise and up-to-date information on several aspects of the consumer market in order to cultivate the most appropriate horticultural crop types, species and cultivars. This includes the specific needs

of retail consumers and the landscapers. Growers also need to understand the market potential of new crops in order to cultivate them in quantities proportionate to the expected market demand.

5.9.2 Comprehensive database

Landscape architects need detailed information on the availability of indigenous plants that are suitable for specific situations. The creation of a continuously updated comprehensive database of indigenous plant species, indicating their preferred climatic settings, their best applications in landscaped environments and in gardens, as well as available stocks, would be of great help to consumers and the entire horticultural industry.

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ADDENDUM A

QUESTIONNAIRE FOR ORNAMENTAL PLANT GROWERS																								
DETERMINING SELECTION CRITERIA AND MARKET POSSIBILITIES FOR THE HORTICULTURAL USE OF THE INDIGENOUS FLORA OF SOUTH AFRICA.																								
Please mark the appropriate space by placing a cross (x) in the block or writing in the space provided.																								
SECTION A DEMOGRAPHICS																								
1	Questionnaire number			V1																				
2	Please indicate in which region your business is situated			V2																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1. Limpopo</td><td style="width: 5%;"></td></tr> <tr><td>2. North-West Province</td><td></td></tr> <tr><td>3. Mpumalanga</td><td></td></tr> <tr><td>4. Gauteng North</td><td></td></tr> <tr><td>5. Gauteng South</td><td></td></tr> <tr><td>6. Free State</td><td></td></tr> <tr><td>7. Kwa-Zulu Natal</td><td></td></tr> <tr><td>8. Western Cape</td><td></td></tr> <tr><td>9. Eastern Cape</td><td></td></tr> <tr><td>10. Northern Cape</td><td></td></tr> </table>	1. Limpopo		2. North-West Province		3. Mpumalanga		4. Gauteng North		5. Gauteng South		6. Free State		7. Kwa-Zulu Natal		8. Western Cape		9. Eastern Cape		10. Northern Cape				
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9. Eastern Cape																								
10. Northern Cape																								
3	Please indicate the kind of operation you are involved in			V3																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1. Large grower (mass production)</td><td style="width: 5%;"></td></tr> <tr><td>2. Medium /small sized grower</td><td></td></tr> <tr><td>3. Specialist grower</td><td></td></tr> <tr><td>4. Indigenous grower</td><td></td></tr> <tr><td>5. Research Institution</td><td></td></tr> <tr><td>6. Botanical Garden</td><td></td></tr> <tr><td>7. Large indigenous grower (mass production)</td><td></td></tr> </table>	1. Large grower (mass production)		2. Medium /small sized grower		3. Specialist grower		4. Indigenous grower		5. Research Institution		6. Botanical Garden		7. Large indigenous grower (mass production)										
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7. Large indigenous grower (mass production)																								
SECTION B CONSUMER KNOWLEDGE AND ATTITUDE TOWARDS INDIGENOUS PLANTS																								
4	From your experience, what percentage of your customers pertinently ask for indigenous plants? _____ %			V4																				
5	Please indicate to which extent you agree or disagree with each one of the following statements.																							
		1 Strongly disagree	2 Disagree	3 Agree	4 Strongly agree																			
5.1	Customers are knowledgeable on the benefits of indigenous plants.				V5.1																			
5.2	Customers often ask for certain indigenous plants that may not be available in the trade yet.				V5.2																			
5.3	There is a strong increase in the demand for indigenous plants				V5.3																			

For office use only

						For office use only
		1 Strongly disagree	2 Disagree	3 Agree	4 Strongly agree	
5	(Continued) Please indicate to which extent you agree or disagree with each one of the following statements.					
5.4	A customer relies on my expertise to suggest alternatives to exotic plants.					V5.4 <input type="checkbox"/>
5.5	As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic					V5.5 <input type="checkbox"/>
5.6	Customers are more concerned about the performance of a plant than whether it is indigenous or exotic					V5.6 <input type="checkbox"/>
5.7	Customers often find the general appearance of indigenous plants 'untidy'					V5.7 <input type="checkbox"/>
5.8	Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants					V5.8 <input type="checkbox"/>
5.9	Customers have entrenched shopping habits and it is difficult for them to change to new products					V5.9 <input type="checkbox"/>
SECTION C						
MARKET DEMAND AND CONSUMER SELECTION CRITERIA						
		1 Not important	2 Of little importance	3 Important	4 Very important	5 Don't know
6	From your experience, how important are the following considerations to your customer when he or she is making a purchase decision on plants.					
Consumer needs						
6.1	Plants must be in fashion					V6.1 <input type="checkbox"/>
6.2	Plants must be non-poisonous					V6.2 <input type="checkbox"/>
6.3	Lifestyle complementing plants (e.g. small gardens, herbs, indoors)					V6.3 <input type="checkbox"/>
6.4	Low maintenance plants (no pruning, feeding, spraying)					V6.4 <input type="checkbox"/>
6.5	Convenient (no messy fruit, leaves, roots)					V6.5 <input type="checkbox"/>
6.6	Customers want new plants (exciting, stimulating, fresh)					V6.6 <input type="checkbox"/>
6.7	Instant results are expected					V6.7 <input type="checkbox"/>
6.8	Plant information (name, behaviour, how to care for it)					V6.8 <input type="checkbox"/>
Plant attributes						
6.9	Neat appearance (bushiness, non-straggling, dense, compact)					V6.9 <input type="checkbox"/>
6.10	Shape of plant (rounded, spreading)					V6.10 <input type="checkbox"/>
6.11	Final size of plant (height and width)					V6.11 <input type="checkbox"/>
6.12	Colour of flowers					V6.12 <input type="checkbox"/>
6.13	Scent of flowers					V6.13 <input type="checkbox"/>
6.14	Size of flowers					V6.14 <input type="checkbox"/>
6.15	Plants attracting wildlife (birds, butterflies)					V6.15 <input type="checkbox"/>

		For office use only				
		1 Not important	2 Of little importance	3 Important	4 Very important	5 Don't know
6	(Continued) From your experience, how important are the following considerations to your customer when he or she is making a purchase decision on plants.					
Horticultural performance						
6.16	Longevity of plant (last for minimum period)					V6.16
6.17	Quality of the plant (total appearance, health, attractiveness)					V6.17
6.18	Plants must conform to "water wise" practice					V6.18
6.19	Suitability of plant for climate					V6.19
6.20	Good garden performance (flowers, leaves)					V6.20
6.21	Good resistance to pests and diseases					V6.21
SECTION D INDUSTRY TRENDS AND MARKET POSSIBILITIES						
		1 Never	2 Rarely	3 Often	4 Very often	5 Don't know
7	To what extent do you experience a lack of variety in indigenous plants in the following groups:					
Growth form						
7.1	Annuals (flowering seedlings)					V7.1
7.2	Herbaceous perennials					V7.2
7.3	Trees					V7.3
7.4	Succulents					V7.4
7.5	Aquatic plants (e.g. water lilies)					V7.5
7.6	Bulbs					V7.6
7.7	Curious plants (e.g. unusual shapes)					V7.7
7.8	Cape flora (proteas, pin cushions)					V7.8
7.9	Shrubs					V7.9
7.10	Climbers					V7.10
7.11	Grass and grass-like plants					V7.11
7.12	Groundcovers					V7.12
7.13	Ferns and foliage plants					V7.13
Special purpose plants						
7.14	Fillers (large beds and quantities)					V7.14
7.15	Colour providing plants					V7.15
7.16	Accent plants (e.g. tree aloes)					V7.16
7.17	Shade plants					V7.17
7.18	Collectibles (e.g. cycads)					V7.18
7.19	Outdoor container plants (patio)					V7.19
7.20	Indoor plants					V7.20
7.21	Drought resistant plants					V7.21
7.22	Erosion control, soil stabilisation					V7.22
7.23	Hedges (screening and security)					V7.23

							For office use only
		1 Never	2 Rarely	3 Often	4 Very often	5 Don't know	
7	(Continued) To what extent do you experience a lack of variety in indigenous plants in the following groups:						
7.24	Replacements for invasive plants						V7.24 <input type="checkbox"/>
7.25	Cold hardy plants						V7.25 <input type="checkbox"/>
	Edible plants						
7.26	Fruit trees						V7.26 <input type="checkbox"/>
7.27	Vegetable seedlings						V7.27 <input type="checkbox"/>
7.28	Herbs – food						V7.28 <input type="checkbox"/>
7.29	Herbs – medicinal						V7.29 <input type="checkbox"/>
SECTION E GROWERS SELECTION CRITERIA							
8	How important are the following to you as a grower when making a choice on a new plant for commercial production?						
		1 Not important	2 Of little importance	3 Important	4 Very important		
	Quality						
8.1	Resistance to major pests and diseases						V8.1 <input type="checkbox"/>
8.2	Good quality retention at all times						V8.2 <input type="checkbox"/>
8.3	Post production persistence						V8.3 <input type="checkbox"/>
8.4	Performance by flowering or lush foliage for a minimum period						V8.4 <input type="checkbox"/>
8.5	Plants must cope with climate of geographical region						V8.5 <input type="checkbox"/>
	Production and handling						
8.6	Regular growth to ensure easy handling and standardisation						V8.6 <input type="checkbox"/>
8.7	Transportability of product						V8.7 <input type="checkbox"/>
8.8	Ability to grow and supply all seasons						V8.8 <input type="checkbox"/>
8.9	Crop turnover and production time						V8.9 <input type="checkbox"/>
8.10	Scheduling for market events						V8.10 <input type="checkbox"/>
	Market and economical considerations						
8.11	High yield at low production and maintenance cost						V8.11 <input type="checkbox"/>
8.12	Adequate commercial life expectancy						V8.12 <input type="checkbox"/>
8.13	Accepted in the market						V8.13 <input type="checkbox"/>
8.14	Market introduction and promotion costs						V8.14 <input type="checkbox"/>
8.15	Market potential of new crop						V8.15 <input type="checkbox"/>
	Horticultural criteria						
	Propagation						
8.16	Vegetative propagation preferred						V8.16 <input type="checkbox"/>
8.17	Propagation by seed preferred						V8.17 <input type="checkbox"/>
8.18	Both seed and vegetative propagation used						V8.18 <input type="checkbox"/>
8.19	Other methods (e.g. tissue culture)						V8.19 <input type="checkbox"/>
8.20	Method must be reliable and consistent						V8.20 <input type="checkbox"/>
8.21	Clone material must be obtained						V8.21 <input type="checkbox"/>

							For office use only
		1 Four (4) weeks	2 Eight (8) weeks	3 Twelve (12) weeks	4 Sixteen (16) weeks	5 Longer	
8	(Continued) What is the minimum period of good garden performance you expect from the following crops?						
8.22	Annuals (seedlings)						V8.22
8.23	Herbaceous perennials						V8.23
8.24	Trees						V8.24
8.25	Succulents						V8.25
8.26	Aquatic plants						V8.26
8.27	Bulbs						V8.27
8.28	Curious plants						V8.28
8.29	Cape flora						V8.29
8.30	Shrubs						V8.30
8.31	Climbers						V8.31
8.32	Grass and grass-like plants						V8.32
8.33	Groundcovers						V8.33
8.34	Ferns and foliage plants						V8.34
What is the maximum production time and crop turnover you expect from the following crops?							
8.35	Annuals (seedlings)						V8.35
8.36	Herbaceous perennials						V8.36
8.37	Trees						V8.37
8.38	Succulents						V8.38
8.39	Aquatic plants						V8.39
8.40	Bulbs						V8.40
8.41	Curious plants						V8.41
8.42	Cape flora						V8.42
8.43	Shrubs						V8.43
8.44	Climbers						V8.44
8.45	Grass and grass-like plants						V8.45
8.46	Groundcovers						V8.46
8.47	Ferns and foliage plants						V8.47
9	From your experience, how difficult or easy is the domestication process of wild plants?						
		1 Very easy	2 Easy	3 Difficult	4 Very difficult	5 Don't know	
9.1	Accessibility of plant material in its natural habitat						V9.1
9.2	Identification of the plant						V9.2
9.3	Biological studies of the plant (flowering time, pollination)						V9.3
9.4	Determination of propagation methods						V9.4
9.5	Determination of cultivation requirements						V9.5
9.6	Selection of horticultural superior forms of the plant (elite types)						V9.6
9.7	Improvement of the plant						V9.7

SECTION F						For office use only					
COMPETITION AND LIMITATIONS TO UTILISATION OF INDIGENOUS PLANTS FOR HORTICULTURAL PURPOSES											
10						1 Not limiting at all	2 Limiting	3 Limiting to a large extent			
Please indicate to which extent the following factors or situations are <u>limiting</u> the utilisation of indigenous plants with horticultural potential											
10.1	Other countries with a high botanical diversity							V10.1	<input type="checkbox"/>		
10.2	The market is saturated in certain plants							V10.2	<input type="checkbox"/>		
10.3	Availability of indigenous plants to substitute popular horticultural plants such as roses and palms							V10.3	<input type="checkbox"/>		
10.4	Widening of geographic distribution of existing ornamental plants							V10.4	<input type="checkbox"/>		
10.5	New exotic plants coming onto the market							V10.5	<input type="checkbox"/>		
10.6	The market dominance of certain plants limiting new entries							V10.6	<input type="checkbox"/>		
11						1 Not important	2 Of little importance	3 Important	4 Very important		
In your opinion, which of the following sources for new ornamental plants may be important in the future?											
11.1	Fashion revivals and re-introductions									V11.1	<input type="checkbox"/>
11.2	Collectors of unusual plants									V11.2	<input type="checkbox"/>
11.3	Specialist nurseries									V11.3	<input type="checkbox"/>
11.4	Renewed interest in heritage plants and old cultivars									V11.4	<input type="checkbox"/>
11.5	Horticultural neglected plants receiving new attention									V11.5	<input type="checkbox"/>
11.6	Botanical gardens and their nurseries									V11.6	<input type="checkbox"/>
11.7	New applications for known plants									V11.7	<input type="checkbox"/>
11.8	New cultivars of existing plants									V11.8	<input type="checkbox"/>
11.9	New indigenous plants from the wild									V11.9	<input type="checkbox"/>

Thank you very much for completing the Questionnaire.

ADDENDUM B

QUESTIONNAIRE FOR GARDEN CENTRES, RETAIL NURSERIES, LANDSCAPE ARCHITECTS AND LANDSCAPE CONTRACTORS																							
DETERMINING SELECTION CRITERIA AND MARKET POSSIBILITIES FOR THE HORTICULTURAL USE OF THE INDIGENOUS FLORA OF SOUTH AFRICA.																							
Please mark the appropriate space by placing a cross (x) in the block or writing in the space provided.			For office use only																				
SECTION A DEMOGRAPHICS																							
1	Questionnaire number		V1 <input type="text"/>																				
2	Please indicate in which region your business is situated		V2 <input type="text"/>																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1. Limpopo</td><td style="width: 5%;"></td></tr> <tr><td>2. North-West Province</td><td></td></tr> <tr><td>3. Mpumalanga</td><td></td></tr> <tr><td>4. Gauteng North</td><td></td></tr> <tr><td>5. Gauteng South</td><td></td></tr> <tr><td>6. Free State</td><td></td></tr> <tr><td>7. Kwa-Zulu Natal</td><td></td></tr> <tr><td>8. Western Cape</td><td></td></tr> <tr><td>9. Eastern Cape</td><td></td></tr> <tr><td>10. Northern Cape</td><td></td></tr> </table>	1. Limpopo		2. North-West Province		3. Mpumalanga		4. Gauteng North		5. Gauteng South		6. Free State		7. Kwa-Zulu Natal		8. Western Cape		9. Eastern Cape		10. Northern Cape			
1. Limpopo																							
2. North-West Province																							
3. Mpumalanga																							
4. Gauteng North																							
5. Gauteng South																							
6. Free State																							
7. Kwa-Zulu Natal																							
8. Western Cape																							
9. Eastern Cape																							
10. Northern Cape																							
3	Please indicate the kind of operation you are involved in		V3 <input type="text"/>																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1. Large life style garden centre</td><td style="width: 5%;"></td></tr> <tr><td>2. Medium /small sized garden centre</td><td></td></tr> <tr><td>3. Specialist retail nursery</td><td></td></tr> <tr><td>4. Indigenous retail nursery</td><td></td></tr> <tr><td>5. Landscape/garden maintenance</td><td></td></tr> <tr><td>6. Landscape architect</td><td></td></tr> <tr><td>7. Landscape contractor</td><td></td></tr> </table>	1. Large life style garden centre		2. Medium /small sized garden centre		3. Specialist retail nursery		4. Indigenous retail nursery		5. Landscape/garden maintenance		6. Landscape architect		7. Landscape contractor									
1. Large life style garden centre																							
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3. Specialist retail nursery																							
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5. Landscape/garden maintenance																							
6. Landscape architect																							
7. Landscape contractor																							
SECTION B CONSUMER KNOWLEDGE AND ATTITUDE TOWARDS INDIGENOUS PLANTS																							
4	From your experience, what percentage of your customers pertinently ask for indigenous plants? _____ %		V4 <input type="text"/>																				
5	Please indicate to which extent you agree or disagree with each one of the following statements.																						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">1 Strongly disagree</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">2 Disagree</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">3 Agree</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">4 Strongly agree</td> </tr> </table>	1 Strongly disagree	2 Disagree	3 Agree	4 Strongly agree																	
1 Strongly disagree	2 Disagree	3 Agree	4 Strongly agree																				
5.1	Customers are knowledgeable on the benefits of indigenous plants.		V5.1 <input type="text"/>																				
5.2	Customers often ask for certain indigenous plants that may not be available in the trade yet.		V5.2 <input type="text"/>																				
5.3	There is a strong increase in the demand for indigenous plants		V5.3 <input type="text"/>																				

						For office use only
		1 Strongly disagree	2 Disagree	3 Agree	4 Strongly agree	
5	(Continued) Please indicate to which extent you agree or disagree with each one of the following statements.					
5.4	A customer relies on my expertise to suggest alternatives to exotic plants.					V5.4 <input type="checkbox"/>
5.5	As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic					V5.5 <input type="checkbox"/>
5.6	Customers are more concerned about the performance of a plant than whether it is indigenous or exotic					V5.6 <input type="checkbox"/>
5.7	Customers often find the general appearance of indigenous plants 'untidy'					V5.7 <input type="checkbox"/>
5.8	Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants					V5.8 <input type="checkbox"/>
5.9	Customers have entrenched shopping habits and it is difficult for them to change to new products					V5.9 <input type="checkbox"/>
SECTION C MARKET DEMAND AND CONSUMER SELECTION CRITERIA						
6	From your experience, how important are the following considerations to your customer when he or she is making a purchase decision on plants.	1 Not important	2 Of little importance	3 Important	4 Very important	5 Don't know
Consumer needs						
6.1	Plants must be in fashion					
6.2	Plants must be non-poisonous					
6.3	Lifestyle complimenting plants (e.g. small gardens, herbs, indoors)					
6.4	Low maintenance plants (no pruning, feeding, spraying)					
6.5	Convenient (no messy fruit, leaves, roots)					
6.6	Customers want new plants (exciting, stimulating, fresh)					
6.7	Instant results are expected					
6.8	Plant information (name, behaviour, how to care for it)					
Plant attributes						
6.9	Neat appearance (bushiness, non-straggling, dense, compact)					
6.10	Shape of plant (rounded, spreading)					
6.11	Final size of plant (height and width)					
6.12	Colour of flowers					
6.13	Scent of flowers					
6.14	Size of flowers					
6.15	Plants attracting wildlife (birds, butterflies)					

		For office use only				
		1 Not important	2 Of little importance	3 Important	4 Very important	5 Don't know
6	(Continued) From your experience, how important are the following considerations to your customer when he or she is making a purchase decision on plants.					
Horticultural performance						
6.16	Longevity of plant (last for minimum period)					V6.16
6.17	Quality of the plant (total appearance, health, attractiveness)					V6.17
6.18	Plants must conform to "water wise" practice					V6.18
6.19	Suitability of plant for climate					V6.19
6.20	Good garden performance (flowers, leaves)					V6.20
6.21	Good resistance to pests and diseases					V6.21
SECTION D						
INDUSTRY TRENDS AND MARKET POSSIBILITIES						
7	To what extent do you experience a lack of variety in indigenous plants in the following groups:	1 Never	2 Rarely	3 Often	4 Very often	5 Don't know
Growth form						
7.1	Annuals (flowering seedlings)					V7.1
7.2	Herbaceous perennials					V7.2
7.3	Trees					V7.3
7.4	Succulents					V7.4
7.5	Aquatic plants (e.g. water lilies)					V7.5
7.6	Bulbs					V7.6
7.7	Curious plants (e.g. unusual shapes)					V7.7
7.8	Cape flora (proteas, pin cushions)					V7.8
7.9	Shrubs					V7.9
7.10	Climbers					V7.10
7.11	Grass and grass-like plants					V7.11
7.12	Groundcovers					V7.12
7.13	Ferns and foliage plants					V7.13
Special purpose plants						
7.14	Fillers (large beds and quantities)					V7.14
7.15	Colour providing plants					V7.15
7.16	Accent plants (e.g. tree aloes)					V7.16
7.17	Shade plants					V7.17
7.18	Collectibles (e.g. cycads)					V7.18
7.19	Outdoor container plants (patio)					V7.19
7.20	Indoor plants					V7.20
7.21	Drought resistant plants					V7.21
7.22	Erosion control, soil stabilisation					V7.22
7.23	Hedges (screening and security)					V7.23

7	(Continued) To what extent do you experience a lack of variety in indigenous plants in the following groups:						For office use only
		1 Never	2 Rarely	3 Often	4 Very often	5 Don't know	
7.24	Replacements for invasive plants						V7.24 <input type="checkbox"/>
7.25	Cold hardy plants						V7.25 <input type="checkbox"/>
	Edible plants						
7.26	Fruit trees						V7.26 <input type="checkbox"/>
7.27	Vegetable seedlings						V7.27 <input type="checkbox"/>
7.28	Herbs – food						V7.28 <input type="checkbox"/>
7.29	Herbs – medicinal						V7.29 <input type="checkbox"/>

Thank you very much for completing the Questionnaire.

ADDENDUM C



13 November 2009

RESEARCH PROJECT: SELECTION CRITERIA FOR THE HORTICULTURAL USE OF INDIGENOUS SOUTHERN AFRICAN FLORA.

Dear Respondent,

We are currently working on a research project regarding the above topic. The research aims to identify relevant selection criteria for new ornamental plants in South Africa and to identify market influences affecting trade in ornamental plants.

The study will analyse the responses from two different parties involved with horticulture, landscaping and trade in ornamental plants, i.e.:

- Growers of ornamental plants and scientists in the field of horticulture
- Retailers in ornamental plants and professionals and knowledgeable parties in the field of landscaping

It would be greatly appreciated if you would complete and return the accompanying questionnaire – it should take you approximately 15 minutes.

Participation is voluntary and the writer undertakes to maintain confidentiality with regard to the respondents' identity.

Please also let the writer know if you would like to receive a summary of the research project's findings.

For any queries about the research project or for further information the writer can be contacted at:

Landscape Architecture Programme (Attention: Prof. Piet Vosloo)
Department of Architecture
University of Pretoria
0002
Republic of South Africa

We thank you in advance for your participation in this research project. Without the input of your valued knowledge and experience, research of this nature would not be possible.

Yours sincerely

Ms. L Middleton
Tel: 012 521 5894
Cell: 0844002530
Researcher

lorraine.middleton@ul.ac.za

Prof. Piet Vosloo
Project Supervisor
Tel: 012 420 4128

piet.vosloo@up.ac.za

ADDENDUM D

Responses to Section A of the questionnaires: Demographics

Question 2: Please indicate in which region your business is situated

Question 3: Please indicate the kind of operation you are involved in

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Q2: Region of business *	190	99.5%	1	.5%	191	100.0%
Q3: Kind of operation						

Q2: Region of business		Q3: Kind of operation							Total
		Garden centres	Special retail nursery	Land-scape industry	Orna-mental plant grower	Special grower	In-digenous grower	Research institution	
Limpopo	Count	3	0	4	1	0	0	0	8
	Row %	37.5%	.0%	50.0%	12.5%	.0%	.0%	.0%	100.0%
	Column %	10.3%	.0%	4.3%	4.0%	.0%	.0%	.0%	4.2%
North-West Province	Count	3	0	0	2	0	2	1	8
	Row %	37.5%	.0%	.0%	25.0%	.0%	25.0%	12.5%	100.0%
	Column %	10.3%	.0%	.0%	8.0%	.0%	10.0%	8.3%	4.2%
Mpumalanga	Count	3	0	7	2	1	4	0	17
	Row %	17.6%	.0%	41.2%	11.8%	5.9%	23.5%	.0%	100.0%
	Column %	10.3%	.0%	7.6%	8.0%	12.5%	20.0%	.0%	8.9%
Gauteng North	Count	7	1	28	9	5	7	5	62
	Row %	11.3%	1.6%	45.2%	14.5%	8.1%	11.3%	8.1%	100.0%
	Column %	24.1%	25.0%	30.4%	36.0%	62.5%	35.0%	41.7%	32.6%
Gauteng South	Count	6	0	16	6	1	0	1	30
	Row %	20.0%	.0%	53.3%	20.0%	3.3%	.0%	3.3%	100.0%
	Column %	20.7%	.0%	17.4%	24.0%	12.5%	.0%	8.3%	15.8%
Free State	Count	2	0	0	0	0	0	0	2
	Row %	100.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	Column %	6.9%	.0%	.0%	.0%	.0%	.0%	.0%	1.1%

Kwa-Zulu	Count	1	2	10	2	0	2	2	19
Natal	Row %	5.3%	10.5%	52.6%	10.5%	.0%	10.5%	10.5%	100.0%
	Column %	3.4%	50.0%	10.9%	8.0%	.0%	10.0%	16.7%	10.0%
Western	Count	3	1	24	2	1	5	3	39
Cape	Row %	7.7%	2.6%	61.5%	5.1%	2.6%	12.8%	7.7%	100.0%
	Column %	10.3%	25.0%	26.1%	8.0%	12.5%	25.0%	25.0%	20.5%
Eastern	Count	1	0	2	1	0	0	0	4
Cape	Row %	25.0%	.0%	50.0%	25.0%	.0%	.0%	.0%	100.0%
	Column %	3.4%	.0%	2.2%	4.0%	.0%	.0%	.0%	2.1%
Northern	Count	0	0	1	0	0	0	0	1
Cape	Row %	.0%	.0%	100.0%	.0%	.0%	.0%	.0%	100.0%
	Column %	.0%	.0%	1.1%	.0%	.0%	.0%	.0%	.5%
Total	Count	29	4	92	25	8	20	12	190
	Row %	15.3%	2.1%	48.4%	13.2%	4.2%	10.5%	6.3%	100.0%
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			%		%	%			

Addendum E

Responses to Section B of the questionnaires: Consumer knowledge and attitude towards indigenous plants

Participants: Global group (whole industry)

Question 4: From your experience, what percentage of your customers pertinently asks for indigenous plants?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	0	3	1.6	1.6	1.6
	2	3	1.6	1.6	3.2
	5	7	3.7	3.7	6.9
	10	15	7.9	8.0	14.9
	13	1	.5	.5	15.4
	15	2	1.0	1.1	16.5
	20	19	9.9	10.1	26.6
	25	4	2.1	2.1	28.7
	30	20	10.5	10.6	39.4
	35	2	1.0	1.1	40.4
	38	1	.5	.5	41.0
	40	8	4.2	4.3	45.2
	45	1	.5	.5	45.7
	50	21	11.0	11.2	56.9
	60	12	6.3	6.4	63.3
	68	1	.5	.5	63.8
	70	9	4.7	4.8	68.6
	75	7	3.7	3.7	72.3
	80	16	8.4	8.5	80.9
	85	6	3.1	3.2	84.0
	90	17	8.9	9.0	93.1
	95	7	3.7	3.7	96.8
	98	3	1.6	1.6	98.4
	99	2	1.0	1.1	99.5
	100	1	.5	.5	100.0
	Total	188	98.4	100.0	
Missing	System	3	1.6		
Total		191	100.0		

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q4: From your experience, what percentage of your customers pertinently asks for indigenous plants?	188	0	100	49.77	30.350
Valid N (listwise)	188				

Participants: Retailers, Landscapers and Growers

Question 4: From your experience, what percentage of your customers pertinently asks for indigenous plants?

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers Valid	2	1.6	1.6	1.6
&	5	4.8	4.9	6.5
Land-	10	5.6	5.7	12.2
scapers	13	.8	.8	13.0
	15	.8	.8	13.8
	20	14	11.4	25.2
	25	4	3.2	28.5
	30	17	13.5	42.3
	35	2	1.6	43.9
	40	6	4.8	48.8
	50	16	12.7	61.8
	60	8	6.3	68.3
	68	1	.8	69.1
	70	5	4.0	73.2
	75	6	4.8	78.0
	80	11	8.7	87.0
	85	5	4.0	91.1
	90	8	6.3	97.6
	95	3	2.4	100.0
Total	123	97.6	100.0	

	Missing	System				
			3	2.4		
	Total		126	100.0		
Growers	Valid	0	3	4.6	4.6	4.6
		2	1	1.5	1.5	6.2
		5	1	1.5	1.5	7.7
		10	8	12.3	12.3	20.0
		15	1	1.5	1.5	21.5
		20	5	7.7	7.7	29.2
		30	3	4.6	4.6	33.8
		38	1	1.5	1.5	35.4
		40	2	3.1	3.1	38.5
		45	1	1.5	1.5	40.0
		50	5	7.7	7.7	47.7
		60	4	6.2	6.2	53.8
		70	4	6.2	6.2	60.0
		75	1	1.5	1.5	61.5
		80	5	7.7	7.7	69.2
		85	1	1.5	1.5	70.8
		90	9	13.8	13.8	84.6
		95	4	6.2	6.2	90.8
		98	3	4.6	4.6	95.4
		99	2	3.1	3.1	98.5
		100	1	1.5	1.5	100.0
	Total		65	100.0	100.0	

Descriptive Statistics

Type		N	Minimum	Maximum	Mean	Std. Deviation
Retailers & Landscapers	Q4: From your experience, what percentage of your customers pertinently asks for indigenous plants?	123	2	95	47.07	27.791
	Valid N (listwise)	123				
Growers	Q4: From your experience, what percentage of you customers pertinently asks for indigenous plants?	65	0	100	54.88	34.333
	Valid N (listwise)	65				

Section B Question 5

Participants: Global group (whole industry)

Question 5.1: Customers are knowledgeable on the benefits of indigenous plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	81	42.4	42.9	42.9
	Agree	108	56.5	57.1	100.0
	Total	189	99.0	100.0	
Missing	System	2	1.0		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.1: Customers are knowledgeable on the benefits of indigenous plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	57	45.2	45.2	45.2
		Agree	69	54.8	54.8	100.0
		Total	126	100.0	100.0	
Growers	Valid	Disagree	24	36.9	38.1	38.1
		Agree	39	60.0	61.9	100.0
		Total	63	96.9	100.0	
	Missing	System	2	3.1		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.2: Customers often ask for certain indigenous plants that may not be available in the trade yet

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	101	52.9	53.7	53.7
	Agree	87	45.5	46.3	100.0
	Total	188	98.4	100.0	
Missing	System	3	1.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.2: Customers often ask for certain indigenous plants that may not be available in the trade yet

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	80	63.5	65.0	65.0
		Agree	43	34.1	35.0	100.0
		Total	123	97.6	100.0	
	Missing	System	3	2.4		
	Total		126	100.0		
Growers	Valid	Disagree	21	32.3	32.3	32.3
		Agree	44	67.7	67.7	100.0
		Total	65	100.0	100.0	

Participants: Global group (whole industry)

Question 5.3: There is a strong increase in the demand for indigenous plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	26	13.6	13.8	13.8
	Agree	163	85.3	86.2	100.0
	Total	189	99.0	100.0	
Missing	System	2	1.0		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.3: There is a strong increase in the demand for indigenous plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	16	12.7	12.9	12.9
		Agree	108	85.7	87.1	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
	Total		126	100.0		
Growers	Valid	Disagree	10	15.4	15.4	15.4
		Agree	55	84.6	84.6	100.0
		Total	65	100.0	100.0	

Participants: Global group (whole industry)

Question 5.4: A customer relies on my expertise to suggest alternatives to exotic plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	11	5.8	5.9	5.9
	Agree	177	92.7	94.1	100.0
	Total	188	98.4	100.0	
Missing	System	3	1.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.4: A customer relies on my expertise to suggest alternatives to exotic plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	3	2.4	2.4	2.4
		Agree	121	96.0	97.6	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
	Total		126	100.0		
Growers	Valid	Disagree	8	12.3	12.5	12.5
		Agree	56	86.2	87.5	100.0
		Total	64	98.5	100.0	
	Missing	System	1	1.5		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	44	23.0	23.8	23.8
	Agree	141	73.8	76.2	100.0
	Total	185	96.9	100.0	
Missing	System	6	3.1		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	29	23.0	23.4	23.4
		Agree	95	75.4	76.6	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
	Total		126	100.0		
Growers	Valid	Disagree	15	23.1	24.6	24.6
		Agree	46	70.8	75.4	100.0
		Total	61	93.8	100.0	
	Missing	System	4	6.2		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	36	18.8	19.4	19.4
	Agree	150	78.5	80.6	100.0
	Total	186	97.4	100.0	
Missing	System	5	2.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic

Type			Frequency	Percentage	Valid Percentage	Cumulative Percent
Retailers & Landscapers	Valid	Disagree	19	15.1	15.3	15.3
		Agree	105	83.3	84.7	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
	Total		126	100.0		
Growers	Valid	Disagree	17	26.2	27.4	27.4
		Agree	45	69.2	72.6	100.0
		Total	62	95.4	100.0	
	Missing	System	3	4.6		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.7: Customers often find the general appearance of indigenous plants 'untidy'

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	65	34.0	34.9	34.9
	Agree	121	63.4	65.1	100.0
	Total	186	97.4	100.0	
Missing	System	5	2.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.7: Customers often find the general appearance of indigenous plants 'untidy'

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	41	32.5	33.6	33.6
		Agree	81	64.3	66.4	100.0
		Total	122	96.8	100.0	
	Missing	System	4	3.2		
	Total		126	100.0		
Growers	Valid	Disagree	24	36.9	37.5	37.5
		Agree	40	61.5	62.5	100.0
		Total	64	98.5	100.0	
	Missing	System	1	1.5		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	52	27.2	28.3	28.3
	Agree	132	69.1	71.7	100.0
	Total	184	96.3	100.0	
Missing	System	7	3.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Disagree	36	28.6	29.5	29.5
		Agree	86	68.3	70.5	100.0
		Total	122	96.8	100.0	
	Missing	System	4	3.2		
	Total		126	100.0		
Growers	Valid	Disagree	16	24.6	25.8	25.8
		Agree	46	70.8	74.2	100.0
		Total	62	95.4	100.0	
	Missing	System	3	4.6		
	Total		65	100.0		

Participants: Global group (whole industry)

Question 5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	97	50.8	54.2	54.2
	Agree	82	42.9	45.8	100.0
	Total	179	93.7	100.0	
Missing	System	12	6.3		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Disagree	61	48.4	50.8	50.8
	Agree	59	46.8	49.2	100.0
	Total	120	95.2	100.0	
	Missing System	6	4.8		
	Total	126	100.0		
Growers	Valid Disagree	36	55.4	61.0	61.0
	Agree	23	35.4	39.0	100.0
	Total	59	90.8	100.0	
	Missing System	6	9.2		
	Total	65	100.0		

Cronbach's Alpha on question 5, omitting V5.2 and V5.4

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	175	91.6
	Excluded ^a	16	8.4
	Total	191	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.736	.735	7

Item Statistics

	Mean	Std. Deviation	N
Q5.1: Customers are knowledgeable on the benefits of indigenous	2.55	.658	175
Q5.3: There is a strong increase in the demand for indigenous plants	3.11	.611	175
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	2.02	.707	175
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	1.97	.677	175
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	2.29	.687	175
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	2.15	.720	175
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	2.53	.659	175

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q5.1: Customers are knowledgeable on the benefits of indigenous	14.06	7.020	.338	.200	.729
Q5.3: There is a strong increase in the demand for indigenous plants	13.50	6.780	.464	.252	.702
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	14.59	6.152	.565	.516	.675
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	14.64	5.967	.666	.584	.651
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	14.31	7.079	.295	.155	.739
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	14.46	6.456	.453	.264	.704
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	14.08	6.890	.377	.151	.720

Factor analysis on question 5: Omit 5.2 and 5.4

Method: Exploratory FA

Principal Axis Factoring\

Rotation: VARIMAX

Number of factors: "Forced" 3 factors

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Q5.1: Customers are knowledgeable on the benefits of indigenous	2.55	.658	175
Q5.3: There is a strong increase in the demand for indigenous plants	3.11	.611	175
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	2.02	.707	175
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	1.97	.677	175
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	2.29	.687	175
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	2.15	.720	175
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	2.53	.659	175

Correlation Matrix

	Q5.1: Customers are knowledgeable on the benefits of indigenous	Q5.3: There is a strong increase in the demand for indigenous plants	Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products
Correlation	1.000	.366	.276	.339	.026	.118	.219
Q5.1: Customers are knowledgeable on the benefits of indigenous							
Q5.3: There is a strong increase in the demand for indigenous plants	.366	1.000	.355	.412	.198	.211	.228
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	.276	.355	1.000	.710	.143	.356	.252
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	.339	.412	.710	1.000	.232	.447	.259
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	.026	.198	.143	.232	1.000	.319	.243
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	.118	.211	.356	.447	.319	1.000	.258
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	.219	.228	.252	.259	.243	.258	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.744
Bartlett's Test of Sphericity	Approx. Chi-Square
	277.713
	df
	21
	Sig.
	.000

Communalities

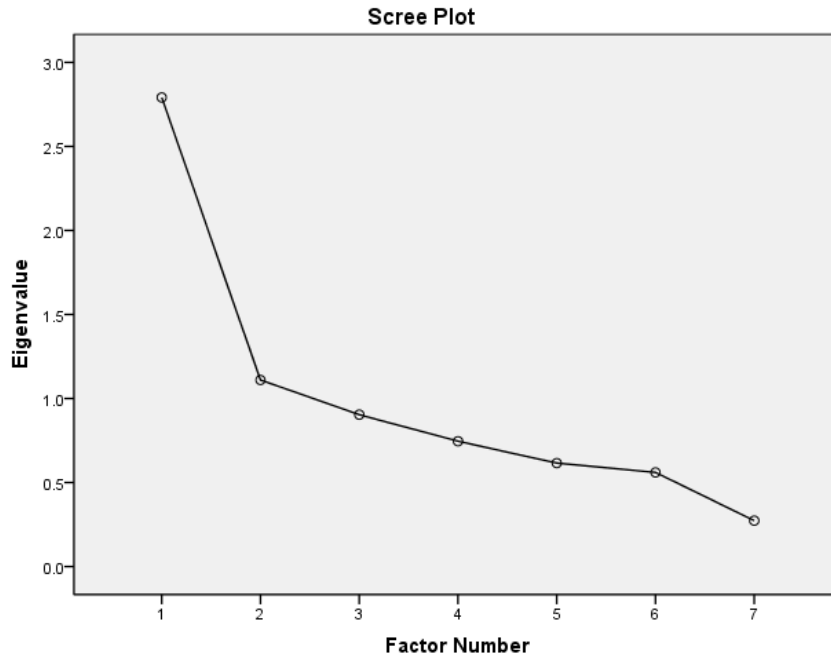
	Initial	Extraction
Q5.1: Customers are knowledgeable on the benefits of indigenous	.200	.511
Q5.3: There is a strong increase in the demand for indigenous plants	.252	.334
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	.516	.625
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	.584	.814
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	.155	.424
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	.264	.355
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	.151	.219

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.791	39.876	39.876	2.341	33.441	33.441	1.494	21.342	21.342
2	1.110	15.858	55.734	.545	7.779	41.220	.913	13.043	34.385
3	.904	12.911	68.645	.397	5.675	46.895	.876	12.510	46.895
4	.746	10.655	79.300						
5	.616	8.796	88.096						
6	.560	8.001	96.097						
7	.273	3.903	100.000						

Extraction Method: Principal Axis Factoring.



Factor Matrix^a

	Factor		
	1	2	3
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	.863		-.259
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	.738		-.268
Q5.3: There is a strong increase in the demand for indigenous plants	.528	-.117	.205
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	.520	.289	
Q5.1: Customers are knowledgeable on the benefits of indigenous	.463	-.420	.348
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	.402	.117	.209
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	.357	.495	.227

Extraction Method: Principal Axis Factoring.

Factor Matrix^a

	Factor		
	1	2	3
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	.863		-.259
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	.738		-.268
Q5.3: There is a strong increase in the demand for indigenous plants	.528	-.117	.205
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	.520	.289	
Q5.1: Customers are knowledgeable on the benefits of indigenous	.463	-.420	.348
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	.402	.117	.209
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'	.357	.495	.227

Extraction Method: Principal Axis Factoring.

a. Attempted to extract 3 factors. More than 25 iterations required. (Convergence=.003). Extraction was terminated.

Rotated Factor Matrix^a

	Factor		
	1	2	3
Q5.6: Customers are more concerned about the performance of a plant than whether it is indigenous or exotic	.822	.287	.237
Q5.5: As long as a plant is attractive it does not matter to a customer whether a plant is indigenous or exotic	.738	.246	.143
Q5.1: Customers are knowledgeable on the benefits of indigenous	.158	.697	
Q5.3: There is a strong increase in the demand for indigenous plants	.273	.458	.223
Q5.7: Customers often find the general appearance of indigenous plants 'untidy'			.646
Q5.8: Customers often prefer certain exotic plants and are not interested in indigenous replacements for these	.380		.454
Q5.9: Customers have entrenched shopping habits and it is difficult for them to change to new products	.155	.261	.356

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Factor Transformation Matrix

Factor	1	2	3
1	.751	.489	.444
2	-.090	-.590	.802
3	-.654	.642	.399

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

Addendum F

Responses to Section C of the questionnaires: Market demand and consumer selection criteria

Question 6: How important are the following considerations to your customer when he or she is making a purchase decision on plants?

Consumer needs: Question 6.1 – 6.8

Participants: Global group (whole industry)

Question 6.1: Consumer needs: Plants must be in fashion

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	83	43.5	44.1	44.1
Important	102	53.4	54.3	98.4
Don't know	3	1.6	1.6	100.0
Total	188	98.4	100.0	
Missing System	3	1.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.1: Consumer needs: Plants must be in fashion

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers Valid Not important	60	47.6	48.8	48.8
Important	60	47.6	48.8	97.6
Don't know	3	2.4	2.4	100.0
Total	123	97.6	100.0	
Missing System	3	2.4		
Total	126	100.0		
Growers Valid Not important	23	35.4	35.4	35.4
Important	42	64.6	64.6	100.0
Total	65	100.0	100.0	

Participants: Global group (whole industry)

Question 6.2: Consumer needs: Plants must be non-poisonous

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	75	39.3	41.9	41.9
Important	101	52.9	56.4	98.3
Don't know	3	1.6	1.7	100.0
Total	179	93.7	100.0	
Missing System	12	6.3		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.2: Consumer needs: Plants must be non-poisonous

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	51	40.5	42.5
	Important	67	53.2	98.3
	Don't know	2	1.6	100.0
	Total	120	95.2	100.0
	Missing System	6	4.8	
	Total	126	100.0	
Growers	Valid Not important	24	36.9	40.7
	Important	34	52.3	98.3
	Don't know	1	1.5	100.0
	Total	59	90.8	100.0
	Missing System	6	9.2	
	Total	65	100.0	

Participants: Global group (whole industry)

Question 6.3: Consumer needs: Lifestyle complimenting plants (e.g. small gardens, herbs, indoors)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	11	5.8	6.0	6.0
Important	168	88.0	91.3	97.3
Don't know	5	2.6	2.7	100.0
Total	184	96.3	100.0	
Missing System	7	3.7		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.3: Consumer needs: Lifestyle complimenting plants (e.g. small gardens, herbs, indoors)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	8	6.3	6.6	6.6
	Important	110	87.3	90.2	96.7
	Don't know	4	3.2	3.3	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
	Total	126	100.0		
Growers	Valid Not important	3	4.6	4.8	4.8
	Important	58	89.2	93.5	98.4
	Don't know	1	1.5	1.6	100.0
	Total	62	95.4	100.0	
	Missing System	3	4.6		
	Total	65	100.0		

Participants: Global group (whole industry)

Question 6.4: Consumer needs: Low maintenance plants (no pruning, feeding, spraying)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	4	2.1	2.1
	Important	182	95.3	99.5
	Don't know	1	.5	100.0
	Total	187	97.9	100.0
Missing System	4	2.1		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.4: Consumer needs: Low maintenance plants (no pruning, feeding, spraying)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	2	1.6	1.6
	Important	121	96.0	98.4
	Total	123	97.6	100.0
	Missing System	3	2.4	
	Total	126	100.0	
Growers	Valid Not important	2	3.1	3.1
	Important	61	93.8	98.4
	Don't know	1	1.5	100.0
	Total	64	98.5	100.0
	Missing System	1	1.5	
Total	65	100.0		

Participants: Global group (whole industry)

Question 6.5: Consumer needs: Convenient (no messy fruit, leaves, roots)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	14	7.3	7.5
	Important	170	89.0	91.4
	Don't know	2	1.0	100.0
	Total	186	97.4	100.0
Missing System	5	2.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.5: Consumer needs: Convenient (no messy fruit, leaves, roots)

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Not important	7	5.6	5.7	5.7
		Important	114	90.5	93.4	99.2
		Don't know	1	.8	.8	100.0
		Total	122	96.8	100.0	
	Missing	System	4	3.2		
		Total	126	100.0		
Growers	Valid	Not important	7	10.8	10.9	10.9
		Important	56	86.2	87.5	98.4
		Don't know	1	1.5	1.6	100.0
		Total	64	98.5	100.0	
	Missing	System	1	1.5		
		Total	65	100.0		

Participants: Global group (whole industry)

Question 6.6: Consumer needs: Customers want new plants (exciting, stimulating, fresh)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	46	24.1	24.9	24.9
	Important	136	71.2	73.5	98.4
	Don't know	3	1.6	1.6	100.0
	Total	185	96.9	100.0	
Missing	System	6	3.1		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.6: Consumer needs: Customers want new plants (exciting, stimulating, fresh)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	37	29.4	30.3	30.3
	Important	82	65.1	67.2	97.5
	Don't know	3	2.4	2.5	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
Total	126	100.0			
Growers	Valid Not important	9	13.8	14.3	14.3
	Important	54	83.1	85.7	100.0
	Total	63	96.9	100.0	
	Missing System	2	3.1		
	Total	65	100.0		

Participants: Global group (whole industry)

Question 6.7: Consumer needs: Instant results are expected

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Not important	26	13.6	13.9	13.9
	Important	160	83.8	85.6	99.5
	Don't know	1	.5	.5	100.0
	Total	187	97.9	100.0	
Missing System	4	2.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Question 6.7: Consumer needs: Instant results are expected

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	15	11.9	12.2
	Important	107	84.9	87.0
	Don't know	1	.8	.8
	Total	123	97.6	100.0
	Missing System	3	2.4	
Total	126	100.0		
Growers	Valid Not important	11	16.9	17.2
	Important	53	81.5	82.8
	Total	64	98.5	100.0
	Missing System	1	1.5	
Total	65	100.0		

Participants: Global group (whole industry)

Question 6.8: Consumer needs: Plant information (name, behaviour, how to care for it)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	45	23.6	24.2
	Important	140	73.3	75.3
	Don't know	1	.5	.5
	Total	186	97.4	100.0
Missing System	5	2.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.8: Consumer needs: Plant information (name, behaviour, how to care for it)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	37	29.4	30.6
	Important	83	65.9	68.6
	Don't know	1	.8	.8
	Total	121	96.0	100.0
	Missing System	5	4.0	
Total	126	100.0		
Growers	Valid Not important	8	12.3	12.3
	Important	57	87.7	87.7
	Total	65	100.0	100.0

Plant attributes Q6.9-6.15

Participants: Global group (whole industry)

Question 6.9: Plant attributes: Neat appearance (bushiness, non-straggling, dense, compact)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	21	11.0	11.5	11.5
Important	157	82.2	85.8	97.3
Don't know	5	2.6	2.7	100.0
Total	183	95.8	100.0	
Missing System	8	4.2		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.9: Plant attributes: Neat appearance (bushiness, non-straggling, dense, compact)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	11	8.7	9.2
	Important	105	83.3	87.5
	Don't know	4	3.2	3.3
	Total	120	95.2	100.0
	Missing System	6	4.8	
Total	126	100.0		
Growers	Valid Not important	10	15.4	15.9
	Important	52	80.0	82.5
	Don't know	1	1.5	1.6
	Total	63	96.9	100.0
	Missing System	2	3.1	
Total	65	100.0		

Participants: Global group (whole industry)

Question 6.10: Plant attributes: Shape of plant (rounded, spreading)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	38	19.9	20.4	20.4
Important	143	74.9	76.9	97.3
Don't know	5	2.6	2.7	100.0
Total	186	97.4	100.0	
Missing System	5	2.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.10: Plant attributes: Shape of plant (rounded, spreading)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	26	20.6	21.1
	Important	94	74.6	97.6
	Don't know	3	2.4	100.0
	Total	123	97.6	100.0
	Missing System	3	2.4	
	Total	126	100.0	
Growers	Valid Not important	12	18.5	19.0
	Important	49	75.4	96.8
	Don't know	2	3.1	100.0
	Total	63	96.9	100.0
	Missing System	2	3.1	
	Total	65	100.0	

Participants: Global group (whole industry)

Question 6.11: Plant attributes: Final size of plant (height and width)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	16	8.4	8.6	8.6
Important	167	87.4	89.3	97.9
Don't know	4	2.1	2.1	100.0
Total	187	97.9	100.0	
Missing System	4	2.1		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.11: Plant attributes: Final size of plant (height and width)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	10	7.9	8.2	8.2
	Important	108	85.7	88.5	96.7
	Don't know	4	3.2	3.3	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
Total	126	100.0			
Growers	Valid Not important	6	9.2	9.2	9.2
	Important	59	90.8	90.8	100.0
	Total	65	100.0	100.0	

Participants: Global group (whole industry)

Question 6.12: Plant attributes: Colour of flowers

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Not important	33	17.3	17.6	17.6
	Important	152	79.6	81.3	98.9
	Don't know	2	1.0	1.1	100.0
	Total	187	97.9	100.0	
Missing System	4	2.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Question 6.12: Plant attributes: Colour of flowers

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Not important	17	13.5	13.8	13.8
		Important	104	82.5	84.6	98.4
		Don't know	2	1.6	1.6	100.0
		Total	123	97.6	100.0	
	Missing	System	3	2.4		
		Total	126	100.0		
Growers	Valid	Not important	16	24.6	25.0	25.0
		Important	48	73.8	75.0	100.0
		Total	64	98.5	100.0	
	Missing	System	1	1.5		
		Total	65	100.0		

Participants: Global group (whole industry)

Question 6.13: Plant attributes: Scent of flowers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	71	37.2	38.2	38.2
	Important	112	58.6	60.2	98.4
	Don't know	3	1.6	1.6	100.0
	Total	186	97.4	100.0	
Missing	System	5	2.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.13: Plant attributes: Scent of flowers

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	43	34.1	35.0
	Important	78	61.9	63.4
	Don't know	2	1.6	1.6
	Total	123	97.6	100.0
	Missing System	3	2.4	
	Total	126	100.0	
Growers	Valid Not important	28	43.1	44.4
	Important	34	52.3	54.0
	Don't know	1	1.5	1.6
	Total	63	96.9	100.0
	Missing System	2	3.1	
	Total	65	100.0	

Participants: Global group (whole industry)

Question 6.14: Plant attributes: Size of flowers

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not important	88	46.1	47.1	47.1
Important	97	50.8	51.9	98.9
Don't know	2	1.0	1.1	100.0
Total	187	97.9	100.0	
Missing System	4	2.1		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.14: Plant attributes: Size of flowers

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	60	47.6	48.8	48.8
	Important	61	48.4	49.6	98.4
	Don't know	2	1.6	1.6	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total	126	100.0			
Growers	Valid Not important	28	43.1	43.8	43.8
	Important	36	55.4	56.3	100.0
	Total	64	98.5	100.0	
	Missing System	1	1.5		
	Total	65	100.0		

Participants: Global group (whole industry)

Question 6.15: Plant attributes: Plants attracting wildlife (birds, butterflies)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Not important	30	15.7	16.0	16.0
	Important	155	81.2	82.4	98.4
	Don't know	3	1.6	1.6	100.0
	Total	188	98.4	100.0	
Missing System	3	1.6			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Question 6.15: Plant attributes: Plants attracting wildlife (birds, butterflies)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	20	15.9	16.3
	Important	101	80.2	82.1
	Don't know	2	1.6	1.6
	Total	123	97.6	100.0
	Missing System	3	2.4	
Total	126	100.0		
Growers	Valid Not important	10	15.4	15.4
	Important	54	83.1	83.1
	Don't know	1	1.5	1.5
	Total	65	100.0	100.0

Horticultural performance 6.16-6.21

Participants: Global group (whole industry)

Question 6.16: Horticultural performance: Longevity of plant (last for minimum period)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	33	17.3	17.6
	Important	154	80.6	81.9
	Don't know	1	.5	.5
	Total	188	98.4	100.0
Missing System	3	1.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.16: Horticultural performance: Longevity of plant (last for minimum period)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	19	15.1	15.3	15.3
	Important	104	82.5	83.9	99.2
	Don't know	1	.8	.8	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
Total	126	100.0			
Growers	Valid Not important	14	21.5	21.9	21.9
	Important	50	76.9	78.1	100.0
	Total	64	98.5	100.0	
	Missing System	1	1.5		
	Total	65	100.0		

Participants: Global group (whole industry)

Question 6.17: Horticultural performance: Quality of the plant (total appearance, health, attractiveness)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Not important	9	4.7	4.8	4.8
	Important	179	93.7	94.7	99.5
	Don't know	1	.5	.5	100.0
	Total	189	99.0	100.0	
Missing System	2	1.0			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Question 6.17: Horticultural performance: Quality of the plant (total appearance, health, attractiveness)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	8	6.3	6.5	6.5
	Important	115	91.3	92.7	99.2
	Don't know	1	.8	.8	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
Total	126	100.0			
Growers	Valid Not important	1	1.5	1.5	1.5
	Important	64	98.5	98.5	100.0
	Total	65	100.0	100.0	

Participants: Global group (whole industry)

Question 6.18: Horticultural performance: Plants must conform to "water wise" practice

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Not important	42	22.0	22.2	22.2
	Important	146	76.4	77.2	99.5
	Don't know	1	.5	.5	100.0
	Total	189	99.0	100.0	
Missing System	2	1.0			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Question 6.18: Horticultural performance: Plants must conform to "water wise" practice

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	23	18.3	18.5
	Important	100	79.4	80.6
	Don't know	1	.8	.8
	Total	124	98.4	100.0
	Missing System	2	1.6	
Total	126	100.0		
Growers	Valid Not important	19	29.2	29.2
	Important	46	70.8	70.8
	Total	65	100.0	100.0

Participants: Global group (whole industry)

Question 6.19: Horticultural performance: Suitability of plant for climate

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	27	14.1	14.4
	Important	160	83.8	85.1
	Don't know	1	.5	.5
	Total	188	98.4	100.0
Missing System	3	1.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.19: Horticultural performance: Suitability of plant for climate

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Not important	18	14.3	14.5
	Important	105	83.3	84.7
	Don't know	1	.8	.8
	Total	124	98.4	100.0
	Missing System	2	1.6	
Total	126	100.0		
Growers	Valid Not important	9	13.8	14.1
	Important	55	84.6	85.9
	Total	64	98.5	100.0
	Missing System	1	1.5	
	Total	65	100.0	

Participants: Global group (whole industry)

Question 6.20: Horticultural performance: Good garden performance (flowers, leaves)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	8	4.2	4.3
	Important	178	93.2	94.7
	Don't know	2	1.0	1.1
	Total	188	98.4	100.0
Missing System	3	1.6		
Total	191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.20: Horticultural performance: Good garden performance (flowers, leaves)

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Not important	5	4.0	4.0	4.0
		Important	117	92.9	94.4	98.4
		Don't know	2	1.6	1.6	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
		Total	126	100.0		
Growers	Valid	Not important	3	4.6	4.7	4.7
		Important	61	93.8	95.3	100.0
		Total	64	98.5	100.0	
	Missing	System	1	1.5		
		Total	65	100.0		

Participants: Global group (whole industry)

Question 6.21: Horticultural performance: Good resistance to pests and diseases

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important	45	23.6	23.9	23.9
	Important	142	74.3	75.5	99.5
	Don't know	1	.5	.5	100.0
	Total	188	98.4	100.0	
Missing	System	3	1.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Question 6.21: Horticultural performance: Good resistance to pests and diseases

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Not important	31	24.6	25.2	25.2
	Important	91	72.2	74.0	99.2
	Don't know	1	.8	.8	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total	126	100.0			
Growers	Valid Not important	14	21.5	21.5	21.5
	Important	51	78.5	78.5	100.0
	Total	65	100.0	100.0	

Addendum G

Responses to Section D of the questionnaires: Industry trends and market possibilities

Question 7: To what extent do you experience a lack of variety in indigenous plants in the following groups?

Growth form: Question7.1 – 7.13

Participants: Global group (whole industry)

Q7.1: Growth from: Annuals (flowering seedlings)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	41	21.5	22.4	22.4
	Often/very often	121	63.4	66.1	88.5
	Don't know	21	11.0	11.5	100.0
	Total	183	95.8	100.0	
Missing	System	8	4.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.1: Growth from: Annuals (flowering seedlings)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	32	25.4	25.8	25.8
	Often/very often	80	63.5	64.5	90.3
	Don't know	12	9.5	9.7	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
Total	126	100.0			
Growers	Valid Never/Rarely	9	13.8	15.3	15.3
	Often/very often	41	63.1	69.5	84.7
	Don't know	9	13.8	15.3	100.0
	Total	59	90.8	100.0	
	Missing System	6	9.2		
Total	65	100.0			

Participants: Global group (whole industry)

Q7.2: Growth from: Herbaceous perennials

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	78	40.8	42.4	42.4
	Often/very often	91	47.6	49.5	91.8
	Don't know	15	7.9	8.2	100.0
	Total	184	96.3	100.0	
Missing System	7	3.7			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.2: Growth from: Herbaceous perennials

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	59	46.8	48.0	48.0
	Often/very often	59	46.8	48.0	95.9
	Don't know	5	4.0	4.1	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
	Total	126	100.0		
Growers	Valid Never/Rarely	19	29.2	31.1	31.1
	Often/very often	32	49.2	52.5	83.6
	Don't know	10	15.4	16.4	100.0
	Total	61	93.8	100.0	
	Missing System	4	6.2		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.3: Growth from: Trees

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	132	69.1	70.6	70.6
	Often/very often	48	25.1	25.7	96.3
	Don't know	7	3.7	3.7	100.0
	Total	187	97.9	100.0	
Missing System	4	2.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.3: Growth from: Trees

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	92	73.0	74.2	74.2
	Often/very often	29	23.0	23.4	97.6
	Don't know	3	2.4	2.4	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	40	61.5	63.5	63.5
	Often/very often	19	29.2	30.2	93.7
	Don't know	4	6.2	6.3	100.0
	Total	63	96.9	100.0	
	Missing System	2	3.1		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.4: Growth from: Succulents

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	108	56.5	58.4	58.4
	Often/very often	67	35.1	36.2	94.6
	Don't know	10	5.2	5.4	100.0
	Total	185	96.9	100.0	
Missing System	6	3.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.4: Growth from: Succulents

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	81	64.3	65.3	65.3
	Often/very often	40	31.7	32.3	97.6
	Don't know	3	2.4	2.4	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	27	41.5	44.3	44.3
	Often/very often	27	41.5	44.3	88.5
	Don't know	7	10.8	11.5	100.0
	Total	61	93.8	100.0	
	Missing System	4	6.2		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.5: Growth from: Aquatic plants (e.g. water lilies)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	66	34.6	35.5	35.5
	Often/very often	104	54.5	55.9	91.4
	Don't know	16	8.4	8.6	100.0
	Total	186	97.4	100.0	
Missing System	5	2.6			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.5: Growth from: Aquatic plants (e.g. water lilies)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	47	37.3	37.9	37.9
	Often/very often	71	56.3	57.3	95.2
	Don't know	6	4.8	4.8	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	19	29.2	30.6	30.6
	Often/very often	33	50.8	53.2	83.9
	Don't know	10	15.4	16.1	100.0
	Total	62	95.4	100.0	
	Missing System	3	4.6		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.6: Growth from: Bulbs

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	108	56.5	59.0	59.0
	Often/very often	57	29.8	31.1	90.2
	Don't know	18	9.4	9.8	100.0
	Total	183	95.8	100.0	
Missing System	8	4.2			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.6: Growth from: Bulbs

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	76	60.3	62.3	62.3
	Often/very often	38	30.2	31.1	93.4
	Don't know	8	6.3	6.6	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
	Total	126	100.0		
Growers	Valid Never/Rarely	32	49.2	52.5	52.5
	Often/very often	19	29.2	31.1	83.6
	Don't know	10	15.4	16.4	100.0
	Total	61	93.8	100.0	
	Missing System	4	6.2		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.7: Growth from: Curiosity plants (e.g. unusual shapes)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	70	36.6	38.5	38.5
	Often/very often	95	49.7	52.2	90.7
	Don't know	17	8.9	9.3	100.0
	Total	182	95.3	100.0	
Missing System	9	4.7			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.7: Growth from: Curiosity plants (e.g. unusual shapes)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	44	34.9	36.1	36.1
	Often/very often	67	53.2	54.9	91.0
	Don't know	11	8.7	9.0	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
	Total	126	100.0		
Growers	Valid Never/Rarely	26	40.0	43.3	43.3
	Often/very often	28	43.1	46.7	90.0
	Don't know	6	9.2	10.0	100.0
	Total	60	92.3	100.0	
	Missing System	5	7.7		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.8: Growth from: Cape flora (proteas, pin cushions)

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	90	47.1	48.9	48.9
	Often/very often	70	36.6	38.0	87.0
	Don't know	24	12.6	13.0	100.0
	Total	184	96.3	100.0	
Missing System	7	3.7			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.8: Growth from: Cape flora (proteas, pin cushions)

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	61	48.4	49.2	49.2
	Often/very often	47	37.3	37.9	87.1
	Don't know	16	12.7	12.9	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	29	44.6	48.3	48.3
	Often/very often	23	35.4	38.3	86.7
	Don't know	8	12.3	13.3	100.0
	Total	60	92.3	100.0	
	Missing System	5	7.7		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.9: Growth from: Shrubs

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	109	57.1	58.3	58.3
	Often/very often	71	37.2	38.0	96.3
	Don't know	7	3.7	3.7	100.0
	Total	187	97.9	100.0	
Missing System	4	2.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.9: Growth from: Shrubs

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	77	61.1	62.1	62.1
	Often/very often	44	34.9	35.5	97.6
	Don't know	3	2.4	2.4	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	32	49.2	50.8	50.8
	Often/very often	27	41.5	42.9	93.7
	Don't know	4	6.2	6.3	100.0
	Total	63	96.9	100.0	
	Missing System	2	3.1		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.10: Growth from: Climbers

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	64	33.5	34.8	34.8
	Often/very often	110	57.6	59.8	94.6
	Don't know	10	5.2	5.4	100.0
	Total	184	96.3	100.0	
Missing System	7	3.7			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.10: Growth from: Climbers

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	45	35.7	36.3	36.3
	Often/very often	74	58.7	59.7	96.0
	Don't know	5	4.0	4.0	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	19	29.2	31.7	31.7
	Often/very often	36	55.4	60.0	91.7
	Don't know	5	7.7	8.3	100.0
	Total	60	92.3	100.0	
	Missing System	5	7.7		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.11: Growth from: Grass and grass-like plants

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	78	40.8	42.2	42.2
	Often/very often	101	52.9	54.6	96.8
	Don't know	6	3.1	3.2	100.0
	Total	185	96.9	100.0	
Missing System	6	3.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.11: Growth from: Grass and grass-like plants

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	57	45.2	46.3	46.3
	Often/very often	64	50.8	52.0	98.4
	Don't know	2	1.6	1.6	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
	Total	126	100.0		
Growers	Valid Never/Rarely	21	32.3	33.9	33.9
	Often/very often	37	56.9	59.7	93.5
	Don't know	4	6.2	6.5	100.0
	Total	62	95.4	100.0	
	Missing System	3	4.6		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.12: Growth from: Groundcovers

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	111	58.1	60.0	60.0
	Often/very often	66	34.6	35.7	95.7
	Don't know	8	4.2	4.3	100.0
	Total	185	96.9	100.0	
Missing System	6	3.1			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.12: Growth from: Groundcovers

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never/Rarely	82	65.1	66.1	66.1
	Often/very often	39	31.0	31.5	97.6
	Don't know	3	2.4	2.4	100.0
	Total	124	98.4	100.0	
	Missing System	2	1.6		
	Total	126	100.0		
Growers	Valid Never/Rarely	29	44.6	47.5	47.5
	Often/very often	27	41.5	44.3	91.8
	Don't know	5	7.7	8.2	100.0
	Total	61	93.8	100.0	
	Missing System	4	6.2		
	Total	65	100.0		

Participants: Global group (whole industry)

Q7.13: Growth from: Ferns and foliage plants

	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Valid	Never/Rarely	66	34.6	36.1	36.1
	Often/very often	102	53.4	55.7	91.8
	Don't know	15	7.9	8.2	100.0
	Total	183	95.8	100.0	
Missing System	8	4.2			
Total	191	100.0			

Participants: Retailers, Landscapers and Growers

Q7.13: Growth from: Ferns and foliage plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	50	39.7	41.3	41.3
		Often/very often	65	51.6	53.7	95.0
		Don't know	6	4.8	5.0	100.0
		Total	121	96.0	100.0	
	Missing	System	5	4.0		
		Total	126	100.0		
Growers	Valid	Never/Rarely	16	24.6	25.8	25.8
		Often/very often	37	56.9	59.7	85.5
		Don't know	9	13.8	14.5	100.0
		Total	62	95.4	100.0	
	Missing	System	3	4.6		
		Total	65	100.0		

Special purpose plants: Question 7.14 – 7.25

Participants: Global group (whole industry)

Q7.14: Special purpose plants: Fillers (large beds and quantities)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	98	51.3	54.1	54.1
	Often/very often	71	37.2	39.2	93.4
	Don't know	12	6.3	6.6	100.0
	Total	181	94.8	100.0	
Missing	System	10	5.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.14: Special purpose plants: Fillers (large beds and quantities)

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	70	55.6	56.9	56.9
		Often/very often	48	38.1	39.0	95.9
		Don't know	5	4.0	4.1	100.0
		Total	123	97.6	100.0	
	Missing	System	3	2.4		
Total			126	100.0		
Growers	Valid	Never/Rarely	28	43.1	48.3	48.3
		Often/very often	23	35.4	39.7	87.9
		Don't know	7	10.8	12.1	100.0
		Total	58	89.2	100.0	
	Missing	System	7	10.8		
Total			65	100.0		

Participants: Global group (whole industry)

Q7.15: Special purpose plants: Colour providing plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	65	34.0	35.5	35.5
	Often/very often	113	59.2	61.7	97.3
	Don't know	5	2.6	2.7	100.0
	Total	183	95.8	100.0	
Missing	System	8	4.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.15: Special purpose plants: Colour providing plants

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	44	34.9	36.1	36.1
	Often/very often	76	60.3	62.3	98.4
	Don't know	2	1.6	1.6	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
Total		126	100.0		
Growers	Valid Never/Rarely	21	32.3	34.4	34.4
	Often/very often	37	56.9	60.7	95.1
	Don't know	3	4.6	4.9	100.0
	Total	61	93.8	100.0	
	Missing System	4	6.2		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.16: Special purpose plants: accent plants (e.g. tree aloes)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	102	53.4	54.8	54.8
	Often/very often	76	39.8	40.9	95.7
	Don't know	8	4.2	4.3	100.0
	Total	186	97.4	100.0	
Missing	System	5	2.6		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.16: Special purpose plants: accent plants (e.g. tree aloes)

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	67	53.2	54.0	54.0
		Often/very often	54	42.9	43.5	97.6
		Don't know	3	2.4	2.4	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
Total		126	100.0			
Growers	Valid	Never/Rarely	35	53.8	56.5	56.5
		Often/very often	22	33.8	35.5	91.9
		Don't know	5	7.7	8.1	100.0
		Total	62	95.4	100.0	
	Missing	System	3	4.6		
Total		65	100.0			

Participants: Global group (whole industry)

Q7.17: Special purpose plants: Shade plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	68	35.6	37.4	37.4
	Often/very often	107	56.0	58.8	96.2
	Don't know	7	3.7	3.8	100.0
	Total	182	95.3	100.0	
Missing	System	9	4.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.17: Special purpose plants: Shade plants

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid				
	Never/Rarely	41	32.5	33.1	33.1
	Often/very often	80	63.5	64.5	97.6
	Don't know	3	2.4	2.4	100.0
	Total	124	98.4	100.0	
Missing	System	2	1.6		
Total		126	100.0		
Growers	Valid				
	Never/Rarely	27	41.5	46.6	46.6
	Often/very often	27	41.5	46.6	93.1
	Don't know	4	6.2	6.9	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.18: Special purpose plants: Collectibles (e.g. cycads)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	80	41.9	43.5	43.5
	Often/very often	88	46.1	47.8	91.3
	Don't know	16	8.4	8.7	100.0
	Total	184	96.3	100.0	
Missing	System	7	3.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.18: Special purpose plants: Collectibles (e.g. cycads)

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	47	37.3	38.5	38.5
	Often/very often	65	51.6	53.3	91.8
	Don't know	10	7.9	8.2	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
Total		126	100.0		
Growers	Valid Never/Rarely	33	50.8	53.2	53.2
	Often/very often	23	35.4	37.1	90.3
	Don't know	6	9.2	9.7	100.0
	Total	62	95.4	100.0	
	Missing System	3	4.6		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.19: Special purpose plants: Outdoor container plants (patio)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	82	42.9	45.1	45.1
	Often/very often	84	44.0	46.2	91.2
	Don't know	16	8.4	8.8	100.0
	Total	182	95.3	100.0	
Missing	System	9	4.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.19: Special purpose plants: Outdoor container plants (patio)

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	54	42.9	43.5	43.5
		Often/very often	60	47.6	48.4	91.9
		Don't know	10	7.9	8.1	100.0
		Total	124	98.4	100.0	
	Missing	System	2	1.6		
Total		126	100.0			
Growers	Valid	Never/Rarely	28	43.1	48.3	48.3
		Often/very often	24	36.9	41.4	89.7
		Don't know	6	9.2	10.3	100.0
		Total	58	89.2	100.0	
	Missing	System	7	10.8		
Total		65	100.0			

Participants: Global group (whole industry)

Q7.20: Special purpose plants: Indoor plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	29	15.2	16.2	16.2
	Often/very often	129	67.5	72.1	88.3
	Don't know	21	11.0	11.7	100.0
	Total	179	93.7	100.0	
Missing	System	12	6.3		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.20: Special purpose plants: Indoor plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	20	15.9	16.5	16.5
		Often/very often	87	69.0	71.9	88.4
		Don't know	14	11.1	11.6	100.0
		Total	121	96.0	100.0	
	Missing	System	5	4.0		
Total		126	100.0			
Growers	Valid	Never/Rarely	9	13.8	15.5	15.5
		Often/very often	42	64.6	72.4	87.9
		Don't know	7	10.8	12.1	100.0
		Total	58	89.2	100.0	
	Missing	System	7	10.8		
Total		65	100.0			

Participants: Global group (whole industry)

Q7.21: Special purpose plants: Drought resistant plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	125	65.4	68.3	68.3
	Often/very often	52	27.2	28.4	96.7
	Don't know	6	3.1	3.3	100.0
	Total	183	95.8	100.0	
Missing	System	8	4.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.21: Special purpose plants: Drought resistant plants

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	85	67.5	69.1	69.1
	Often/very often	35	27.8	28.5	97.6
	Don't know	3	2.4	2.4	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total		126	100.0		
Growers	Valid Never/Rarely	40	61.5	66.7	66.7
	Often/very often	17	26.2	28.3	95.0
	Don't know	3	4.6	5.0	100.0
	Total	60	92.3	100.0	
	Missing System	5	7.7		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.22: Special purpose plants: Erosion control, soil, stabilisation

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	90	47.1	49.7	49.7
	Often/very often	65	34.0	35.9	85.6
	Don't know	26	13.6	14.4	100.0
	Total	181	94.8	100.0	
Missing	System	10	5.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.22: Special purpose plants: Erosion control, soil, stabilisation

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	55	43.7	45.1	45.1
	Often/very often	52	41.3	42.6	87.7
	Don't know	15	11.9	12.3	100.0
	Total	122	96.8	100.0	
	Missing System	4	3.2		
Total		126	100.0		
Growers	Valid Never/Rarely	35	53.8	59.3	59.3
	Often/very often	13	20.0	22.0	81.4
	Don't know	11	16.9	18.6	100.0
	Total	59	90.8	100.0	
	Missing System	6	9.2		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.23: Special purpose plants: Hedges (screening and security)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	93	48.7	51.4	51.4
	Often/very often	72	37.7	39.8	91.2
	Don't know	16	8.4	8.8	100.0
	Total	181	94.8	100.0	
Missing	System	10	5.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.23: Special purpose plants: Hedges (screening and security)

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid				
	Never/Rarely	64	50.8	52.0	52.0
	Often/very often	51	40.5	41.5	93.5
	Don't know	8	6.3	6.5	100.0
	Total	123	97.6	100.0	
Missing	System	3	2.4		
Total		126	100.0		
Growers	Valid				
	Never/Rarely	29	44.6	50.0	50.0
	Often/very often	21	32.3	36.2	86.2
	Don't know	8	12.3	13.8	100.0
	Total	58	89.2	100.0	
	Missing	System	7	10.8	
Total		65	100.0		

Participants: Global group (whole industry)

Q7.24: Special purpose plants: Replacement for invasive plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	103	53.9	56.9	56.9
	Often/very often	67	35.1	37.0	93.9
	Don't know	11	5.8	6.1	100.0
	Total	181	94.8	100.0	
Missing	System	10	5.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.24: Special purpose plants: Replacement for invasive plants

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	73	57.9	59.8	59.8
		Often/very often	42	33.3	34.4	94.3
		Don't know	7	5.6	5.7	100.0
		Total	122	96.8	100.0	
	Missing	System	4	3.2		
Total		126	100.0			
Growers	Valid	Never/Rarely	30	46.2	50.8	50.8
		Often/very often	25	38.5	42.4	93.2
		Don't know	4	6.2	6.8	100.0
		Total	59	90.8	100.0	
	Missing	System	6	9.2		
Total		65	100.0			

Participants: Global group (whole industry)

Q7.25: Special purpose plants: Cold hardy plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	60	31.4	33.0	33.0
	Often/very often	100	52.4	54.9	87.9
	Don't know	22	11.5	12.1	100.0
	Total	182	95.3	100.0	
Missing	System	9	4.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.25: Special purpose plants: Cold hardy plants

Type	Frequency	Percentage	Valid Percentage	Cumulative Percentage	
Retailers & Landscapers	Valid Never	8	6.3	6.5	6.5
	Rarely	37	29.4	30.1	36.6
	Often	41	32.5	33.3	69.9
	Very often	18	14.3	14.6	84.6
	Don't know	19	15.1	15.4	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total	126	100.0			
Growers	Valid Never	1	1.5	1.7	1.7
	Rarely	14	21.5	23.7	25.4
	Often	22	33.8	37.3	62.7
	Very often	19	29.2	32.2	94.9
	Don't know	3	4.6	5.1	100.0
	Total	59	90.8	100.0	
	Missing System	6	9.2		
Total	65	100.0			

Edible plants: Question 7.26 – 7.29

Participants: Global group (whole industry)

Q7.26: Edible plants: Fruit trees

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	57	29.8	31.0	31.0
	Often/very often	105	55.0	57.1	88.0
	Don't know	22	11.5	12.0	100.0
	Total	184	96.3	100.0	
Missing	System	7	3.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.26: Edible plants: Fruit trees

Type			Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid	Never/Rarely	42	33.3	34.1	34.1
		Often/very often	68	54.0	55.3	89.4
		Don't know	13	10.3	10.6	100.0
		Total	123	97.6	100.0	
	Missing	System	3	2.4		
Total			126	100.0		
Growers	Valid	Never/Rarely	15	23.1	24.6	24.6
		Often/very often	37	56.9	60.7	85.2
		Don't know	9	13.8	14.8	100.0
		Total	61	93.8	100.0	
	Missing	System	4	6.2		
Total			65	100.0		

Participants: Global group (whole industry)

Q7.27: Edible plants: Vegetable seedlings

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	57	29.8	31.5	31.5
	Often/very often	85	44.5	47.0	78.5
	Don't know	39	20.4	21.5	100.0
	Total	181	94.8	100.0	
Missing	System	10	5.2		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.27: Edible plants: Vegetable seedlings

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	41	32.5	33.3	33.3
	Often/very often	56	44.4	45.5	78.9
	Don't know	26	20.6	21.1	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total		126	100.0		
Growers	Valid Never/Rarely	16	24.6	27.6	27.6
	Often/very often	29	44.6	50.0	77.6
	Don't know	13	20.0	22.4	100.0
	Total	58	89.2	100.0	
	Missing System	7	10.8		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.28: Edible plants: Herbs - food

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	57	29.8	31.3	31.3
	Often/very often	93	48.7	51.1	82.4
	Don't know	32	16.8	17.6	100.0
	Total	182	95.3	100.0	
Missing	System	9	4.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.28: Edible plants: Herbs - food

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid Never/Rarely	38	30.2	30.9	30.9
	Often/very often	65	51.6	52.8	83.7
	Don't know	20	15.9	16.3	100.0
	Total	123	97.6	100.0	
	Missing System	3	2.4		
Total		126	100.0		
Growers	Valid Never/Rarely	19	29.2	32.2	32.2
	Often/very often	28	43.1	47.5	79.7
	Don't know	12	18.5	20.3	100.0
	Total	59	90.8	100.0	
	Missing System	6	9.2		
Total		65	100.0		

Participants: Global group (whole industry)

Q7.29: Edible plants: Herbs - medicinal

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Never/Rarely	67	35.1	36.8	36.8
	Often/very often	77	40.3	42.3	79.1
	Don't know	38	19.9	20.9	100.0
	Total	182	95.3	100.0	
Missing	System	9	4.7		
Total		191	100.0		

Participants: Retailers, Landscapers and Growers

Q7.29: Edible plants: Herbs - medicinal

Type		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Retailers & Landscapers	Valid				
	Never/Rarely	43	34.1	35.0	35.0
	Often/very often	53	42.1	43.1	78.0
	Don't know	27	21.4	22.0	100.0
	Total	123	97.6	100.0	
Missing	System	3	2.4		
Total		126	100.0		
Growers	Valid				
	Never/Rarely	24	36.9	40.7	40.7
	Often/very often	24	36.9	40.7	81.4
	Don't know	11	16.9	18.6	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Addendum H

Responses to Section E of the questionnaires: Growers selection criteria

Question 8: How important are the following to you as a grower when making a choice on a new plant for commercial production?

Quality: Question 8.1 – 8.5

Question 8.1: Quality: Resistance to major pests and diseases

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	7	10.8	11.7	11.7
	Important	53	81.5	88.3	100.0
	Total	60	92.3	100.0	
Missing	System	5	7.7		
Total		65	100.0		

Question 8.2: Quality: Good quality retention at all times

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	4	6.2	6.8	6.8
	Important	55	84.6	93.2	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 8.3: Quality: Post production persistence

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	1	1.5	1.8	1.8
	Important	56	86.2	98.2	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 8.4: Quality: Performance by flowering or lush foliage for a minimum period

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	10	15.4	16.9	16.9
	Important	49	75.4	83.1	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 8.5: Quality: Plants must cope with climate of geographical region

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	2	3.1	3.4	3.4
	Important	56	86.2	96.6	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Production and handling: Question 8.6 – 8.10

Question 8.6: Production and handling: Regular growth to ensure easy handling and standardisation

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	5	7.7	8.6	8.6
	Important	53	81.5	91.4	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 8.7: Production and handling: Transportability of product

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.3	15.3
	Important	50	76.9	84.7	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 8.8: Production and handling: Ability to grow and supply all seasons

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	12	18.5	20.7	20.7
	Important	46	70.8	79.3	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 8.9: Production and handling: Crop turnover and production time

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.8	15.8
	Important	48	73.8	84.2	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 8.10: Production and handling: Scheduling for market events

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	21	32.3	38.2	38.2
	Important	34	52.3	61.8	100.0
	Total	55	84.6	100.0	
Missing	System	10	15.4		
Total		65	100.0		

Market and economic considerations: Question 8.11 – 8.15

Question 8.11: Market and economic considerations: High yield at low production and maintenance cost

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	10	15.4	17.5	17.5
	Important	47	72.3	82.5	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 8.12: Market and economic considerations: Adequate commercial life expectancy

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	5	7.7	8.6	8.6
	Important	53	81.5	91.4	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 8.13: Market and economic considerations: Accepted in the market

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	2	3.1	3.4	3.4
	Important	56	86.2	96.6	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 8.14: Market and economic considerations: Market introduction and promotion costs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	16	24.6	27.6	27.6
	Important	42	64.6	72.4	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 8.15: Market and economic considerations: Market potential of the new crop

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	4	6.2	6.9	6.9
	Important	54	83.1	93.1	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Propagation: Question 8.16 – 8.21

Question 8.16: Propagation: Vegetative propagation preferred

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	12	18.5	21.8	21.8
	Important	43	66.2	78.2	100.0
	Total	55	84.6	100.0	
Missing	System	10	15.4		
Total		65	100.0		

Question 8.17: Propagation: Propagation by seed preferred

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	24	36.9	42.9	42.9
	Important	32	49.2	57.1	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 8.18: Propagation: Both seed and vegetative propagation used

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.3	15.3
	Important	50	76.9	84.7	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 8.19: Propagation: Other methods (e.g. tissue culture)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	37	56.9	66.1	66.1
	Important	19	29.2	33.9	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 8.20: Propagation: Method must be reliable and consistent

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Important	59	90.8	100.0	100.0
Missing	System	6	9.2		
Total		65	100.0		

Question 8.21: Propagation: Clone material must be obtained

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	23	35.4	40.4	40.4
	Important	34	52.3	59.6	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Minimum period of good garden performance: Question 8.22 – 8.34

Question 8.22: Minimum period of good garden performance for: Annuals (seedlings)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	8	12.3	15.7	15.7
	Eight (8) weeks	7	10.8	13.7	29.4
	Twelve (12) weeks	25	38.5	49.0	78.4
	Sixteen (16) weeks	6	9.2	11.8	90.2
	Longer	5	7.7	9.8	100.0
	Total	51	78.5	100.0	
Missing	System	14	21.5		
Total		65	100.0		

Question 8.23: Minimum period of good garden performance for: Herbaceous perennials

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	1	1.5	1.9	1.9
	Eight (8) weeks	6	9.2	11.3	13.2
	Twelve (12) weeks	13	20.0	24.5	37.7
	Sixteen (16) weeks	8	12.3	15.1	52.8
	Longer	25	38.5	47.2	100.0
	Total	53	81.5	100.0	
Missing	System	12	18.5		
Total		65	100.0		

Question 8.24: Minimum period of good garden performance for: Trees

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	1	1.5	1.8	1.8
	Twelve (12) weeks	2	3.1	3.6	5.5
	Sixteen (16) weeks	1	1.5	1.8	7.3
	Longer	51	78.5	92.7	100.0
	Total	55	84.6	100.0	
Missing	System	10	15.4		
Total		65	100.0		

Question 8.25: Minimum period of good garden performance for: Succulents

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	1	1.5	2.0	2.0
	Eight (8) weeks	3	4.6	5.9	7.8
	Twelve (12) weeks	4	6.2	7.8	15.7
	Sixteen (16) weeks	1	1.5	2.0	17.6
	Longer	42	64.6	82.4	100.0
	Total	51	78.5	100.0	
Missing	System	14	21.5		
Total		65	100.0		

Question 8.26: Minimum period of good garden performance for: Aquatic plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	4	6.2	8.2	8.2
	Twelve (12) weeks	11	16.9	22.4	30.6
	Sixteen (16) weeks	5	7.7	10.2	40.8
	Longer	29	44.6	59.2	100.0
	Total	49	75.4	100.0	
Missing	System	16	24.6		
Total		65	100.0		

Question 8.27: Minimum period of good garden performance for: Bulbs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	9	13.8	18.8	18.8
	Eight (8) weeks	9	13.8	18.8	37.5
	Twelve (12) weeks	9	13.8	18.8	56.3
	Sixteen (16) weeks	7	10.8	14.6	70.8
	Longer	14	21.5	29.2	100.0
	Total	48	73.8	100.0	
Missing	System	17	26.2		
Total		65	100.0		

Question 8.28: Minimum period of good garden performance for: Curiosity plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	2	3.1	4.3	4.3
	Eight (8) weeks	3	4.6	6.4	10.6
	Twelve (12) weeks	8	12.3	17.0	27.7
	Sixteen (16) weeks	4	6.2	8.5	36.2
	Longer	30	46.2	63.8	100.0
	Total	47	72.3	100.0	
Missing	System	18	27.7		
Total		65	100.0		

Question 8.29: Minimum period of good garden performance for: Cape flora

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	3	4.6	6.4	6.4
	Eight (8) weeks	4	6.2	8.5	14.9
	Twelve (12) weeks	10	15.4	21.3	36.2
	Sixteen (16) weeks	5	7.7	10.6	46.8
	Longer	25	38.5	53.2	100.0
Total		47	72.3	100.0	
Missing	System	18	27.7		
Total		65	100.0		

Question 8.30: Minimum period of good garden performance for: Shrubs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	2	3.1	3.8	3.8
	Twelve (12) weeks	9	13.8	17.3	21.2
	Sixteen (16) weeks	3	4.6	5.8	26.9
	Longer	38	58.5	73.1	100.0
Total		52	80.0	100.0	
Missing	System	13	20.0		
Total		65	100.0		

Question 8.31: Minimum period of good garden performance for: Climbers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	1	1.5	2.0	2.0
	Twelve (12) weeks	9	13.8	17.6	19.6
	Sixteen (16) weeks	5	7.7	9.8	29.4
	Longer	36	55.4	70.6	100.0
	Total	51	78.5	100.0	
Missing	System	14	21.5		
Total		65	100.0		

Question 8.32: Minimum period of good garden performance for: Grass and grass-like plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	2	3.1	3.8	3.8
	Twelve (12) weeks	8	12.3	15.4	19.2
	Sixteen (16) weeks	7	10.8	13.5	32.7
	Longer	35	53.8	67.3	100.0
	Total	52	80.0	100.0	
Missing	System	13	20.0		
Total		65	100.0		

Question 8.33: Minimum period of good garden performance for: Groundcovers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	2	3.1	3.8	3.8
	Twelve (12) weeks	6	9.2	11.5	15.4
	Sixteen (16) weeks	5	7.7	9.6	25.0
	Longer	39	60.0	75.0	100.0
	Total	52	80.0	100.0	
Missing	System	13	20.0		
Total		65	100.0		

Question 8.34: Minimum period of good garden performance for: Ferns and foliage plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Twelve (12) weeks	6	9.2	12.2	12.2
	Sixteen (16) weeks	6	9.2	12.2	24.5
	Longer	37	56.9	75.5	100.0
	Total	49	75.4	100.0	
Missing	System	16	24.6		
Total		65	100.0		

Maximum production time and crop turnover Question 8.35 – 8.47

Question 8.35: Maximum production time and crop turnover for: Annuals (seedlings)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	3	4.6	7.1	7.1
	Eight (8) weeks	17	26.2	40.5	47.6
	Twelve (12) weeks	11	16.9	26.2	73.8
	Sixteen (16) weeks	9	13.8	21.4	95.2
	Longer	2	3.1	4.8	100.0
	Total	42	64.6	100.0	
Missing	System	23	35.4		
Total		65	100.0		

Question 8.36: Maximum production time and crop turnover for: Herbaceous perennials

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	2	3.1	4.2	4.2
	Eight (8) weeks	11	16.9	22.9	27.1
	Twelve (12) weeks	14	21.5	29.2	56.3
	Sixteen (16) weeks	11	16.9	22.9	79.2
	Longer	10	15.4	20.8	100.0
	Total	48	73.8	100.0	
Missing	System	17	26.2		
Total		65	100.0		

Question 8.37: Maximum production time and crop turnover for: Trees

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Twelve (12) weeks	2	3.1	3.9	3.9
	Sixteen (16) weeks	3	4.6	5.9	9.8
	Longer	46	70.8	90.2	100.0
	Total	51	78.5	100.0	
Missing	System	14	21.5		
Total		65	100.0		

Question 8.38: Maximum production time and crop turnover for: Succulents

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	4	6.2	8.7	8.7
	Twelve (12) weeks	5	7.7	10.9	19.6
	Sixteen (16) weeks	8	12.3	17.4	37.0
	Longer	29	44.6	63.0	100.0
	Total	46	70.8	100.0	
Missing	System	19	29.2		
Total		65	100.0		

Question 8.39: Maximum production time and crop turnover for: Aquatic plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	3	4.6	8.1	8.1
	Twelve (12) weeks	5	7.7	13.5	21.6
	Sixteen (16) weeks	7	10.8	18.9	40.5
	Longer	22	33.8	59.5	100.0
	Total	37	56.9	100.0	
Missing	System	28	43.1		
Total		65	100.0		

Question 8.40: Maximum production time and crop turnover for: Bulbs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	3	4.6	8.1	8.1
	Eight (8) weeks	4	6.2	10.8	18.9
	Twelve (12) weeks	4	6.2	10.8	29.7
	Sixteen (16) weeks	3	4.6	8.1	37.8
	Longer	23	35.4	62.2	100.0
	Total	37	56.9	100.0	
Missing	System	28	43.1		
Total		65	100.0		

Question 8.41: Maximum production time and crop turnover for: Curiosity plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	2	3.1	5.3	5.3
	Eight (8) weeks	1	1.5	2.6	7.9
	Twelve (12) weeks	4	6.2	10.5	18.4
	Sixteen (16) weeks	3	4.6	7.9	26.3
	Longer	28	43.1	73.7	100.0
	Total	38	58.5	100.0	
Missing	System	27	41.5		
Total		65	100.0		

Question 8.42: Maximum production time and crop turnover for: Cape flora

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	3	4.6	7.9	7.9
	Twelve (12) weeks	4	6.2	10.5	18.4
	Sixteen (16) weeks	6	9.2	15.8	34.2
	Longer	25	38.5	65.8	100.0
	Total	38	58.5	100.0	
Missing	System	27	41.5		
Total		65	100.0		

Question 8.43: Maximum production time and crop turnover for: Shrubs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	1	1.5	2.1	2.1
	Twelve (12) weeks	5	7.7	10.6	12.8
	Sixteen (16) weeks	5	7.7	10.6	23.4
	Longer	36	55.4	76.6	100.0
	Total	47	72.3	100.0	
Missing	System	18	27.7		
Total		65	100.0		

Question 8.44: Maximum production time and crop turnover for: Climbers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	1	1.5	2.2	2.2
	Twelve (12) weeks	7	10.8	15.6	17.8
	Sixteen (16) weeks	10	15.4	22.2	40.0
	Longer	27	41.5	60.0	100.0
	Total	45	69.2	100.0	
Missing	System	20	30.8		
Total		65	100.0		

Question 8.45: Maximum production time and crop turnover for: Grass and grass-like plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	1	1.5	2.1	2.1
	Eight (8) weeks	2	3.1	4.2	6.3
	Twelve (12) weeks	15	23.1	31.3	37.5
	Sixteen (16) weeks	10	15.4	20.8	58.3
	Longer	20	30.8	41.7	100.0
	Total	48	73.8	100.0	
Missing	System	17	26.2		
Total		65	100.0		

Question 8.46: Maximum production time and crop turnover for: Groundcovers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Four (4) weeks	1	1.5	2.0	2.0
	Eight (8) weeks	8	12.3	16.3	18.4
	Twelve (12) weeks	12	18.5	24.5	42.9
	Sixteen (16) weeks	12	18.5	24.5	67.3
	Longer	16	24.6	32.7	100.0
	Total	49	75.4	100.0	
Missing	System	16	24.6		
Total		65	100.0		

Question 8.47: Maximum production time and crop turnover for: Ferns and foliage plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Eight (8) weeks	1	1.5	2.2	2.2
	Twelve (12) weeks	5	7.7	11.1	13.3
	Sixteen (16) weeks	11	16.9	24.4	37.8
	Longer	28	43.1	62.2	100.0
	Total	45	69.2	100.0	
Missing	System	20	30.8		
Total		65	100.0		

The domestication of wild plants: Question 9.1 – 9.7:

Question 9.1: How difficult or easy is the accessibility of plant material in its natural habitat

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	15	23.1	26.3	26.3
	Difficult	35	53.8	61.4	87.7
	Don't know	7	10.8	12.3	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 9.2: How difficult or easy is the identification of the plant

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	24	36.9	43.6	43.6
	Difficult	28	43.1	50.9	94.5
	Don't know	3	4.6	5.5	100.0
	Total	55	84.6	100.0	
Missing	System	10	15.4		
Total		65	100.0		

Question 9.3: How difficult or easy is the biological studies of the plant (flowering time, pollination)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	14	21.5	24.6	24.6
	Difficult	37	56.9	64.9	89.5
	Don't know	6	9.2	10.5	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 9.4: How difficult or easy is the determination of propagation methods

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	19	29.2	33.9	33.9
	Difficult	33	50.8	58.9	92.9
	Don't know	4	6.2	7.1	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 9.5: How difficult or easy is the determination of cultivation requirements

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	12	18.5	21.4	21.4
	Difficult	40	61.5	71.4	92.9
	Don't know	4	6.2	7.1	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 9.6: How difficult or easy is the selection of horticultural superior forms of the plant (elite types)

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	11	16.9	19.6	19.6
	Difficult	35	53.8	62.5	82.1
	Don't know	10	15.4	17.9	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 9.7: How difficult or easy is the improvement of the plant

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Easy	10	15.4	17.5	17.5
	Difficult	38	58.5	66.7	84.2
	Don't know	9	13.8	15.8	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Addendum I

Responses to Section F of the questionnaires: Competition and limitations to the utilisation of indigenous plants for horticultural purposes

Question 10: Please indicate to which extent the following factors or situations are limiting the utilisation of indigenous plants with horticultural potential

Question 10.1: Limiting factors: Other countries with a high botanical diversity

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	33	50.8	58.9	58.9
	Limiting	12	18.5	21.4	80.4
	Limiting to a large extent	11	16.9	19.6	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 10.2: Limiting factors: The market is saturated in certain plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	21	32.3	37.5	37.5
	Limiting	23	35.4	41.1	78.6
	Limiting to a large extent	12	18.5	21.4	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 10.3: Limiting factors: Availability of indigenous plants to substitute popular horticultural plants such as roses and palms

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	10	15.4	17.9	17.9
	Limiting	20	30.8	35.7	53.6
	Limiting to a large extent	26	40.0	46.4	100.0
	Total	56	86.2	100.0	
Missing	System	9	13.8		
Total		65	100.0		

Question 10.4: Limiting factors: Widening of geographic distribution of existing ornamental plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	14	21.5	26.4	26.4
	Limiting	26	40.0	49.1	75.5
	Limiting to a large extent	13	20.0	24.5	100.0
	Total	53	81.5	100.0	
Missing	System	12	18.5		
Total		65	100.0		

Question 10.5: Limiting factors: New exotic plants coming onto the market

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	17	26.2	29.8	29.8
	Limiting	26	40.0	45.6	75.4
	Limiting to a large extent	14	21.5	24.6	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 10.6: Limiting factors: The market dominance of certain plants limiting new entries

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not limiting at all	22	33.8	38.6	38.6
	Limiting	19	29.2	33.3	71.9
	Limiting to a large extent	16	24.6	28.1	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 11: In your opinion, which of the following sources for new ornamental plants may be important in the future?

Question 11.1: Sources: Fashion revivals and re-introductions

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.8	15.8
	Important	48	73.8	84.2	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 11.2: Sources: Collectors of unusual plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	24	36.9	41.4	41.4
	Important	34	52.3	58.6	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 11.3: Sources: Specialist nurseries

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	12	18.5	20.3	20.3
	Important	47	72.3	79.7	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 11.4: Sources: Renewed interest in heritage plants and old cultivars

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	16	24.6	27.1	27.1
	Important	43	66.2	72.9	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		

Question 11.5: Sources: Horticultural neglected plants receiving new attention

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.8	15.8
	Important	48	73.8	84.2	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 11.6: Sources: Botanical gardens and their nurseries

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	12	18.5	21.1	21.1
	Important	45	69.2	78.9	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 11.7: Sources: New applications for known plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	10	15.4	17.5	17.5
	Important	47	72.3	82.5	100.0
	Total	57	87.7	100.0	
Missing	System	8	12.3		
Total		65	100.0		

Question 11.8: Sources: New cultivars of existing plants

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	9	13.8	15.5	15.5
	Important	49	75.4	84.5	100.0
	Total	58	89.2	100.0	
Missing	System	7	10.8		
Total		65	100.0		

Question 11.9: Sources: New indigenous plants from the wild

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not important/of little importance	5	7.7	8.5	8.5
	Important	54	83.1	91.5	100.0
	Total	59	90.8	100.0	
Missing	System	6	9.2		
Total		65	100.0		