Chapter 3

Survey of utilisation, constraints and perception of sweet potato among small-scale farmers in South Africa

3.1 Introduction

Sweet potato (*Ipomoea batatas* Lam, Convolvulaceae) is an important food source to many rural families, primarily ensuring food security for the poor and as a cash crop in most parts of the world, including South Africa (Steinbauer and Kushman, 1971; Scott *et al.*, 2000). Apart from being high in carbohydrates and vitamin A (orange-fleshed cultivars), the crop is easy to grow even in poorly productive soil (Steinbauer and Kushman, 1971; Karyeija *et al.*, 1998; Ewell and Mutuura, 1991; Anonymous, 2002). Unfortunately, the crop is very susceptible to viral diseases, which have been recognised in South Africa since 1940's as the cause of yield and quality loss (McClean and Klesser, 1947). It was later discovered by Thompson and Mynhardt (1986) that local cultivars were infected with a flexuous rod-shaped virus, which was serologically related to sweet potato feathery mottle virus (SPFMV). Although sweet potato viruses have been recognised for many years (Joubert *et al.*, 1974; Thompson and Meynhardt, 1986), most small-scale farmers still do not know or understand what sweet potato viruses are.

The first baseline survey on root crops such as sweet potato and cassava was conducted in 1996/1997 in four areas of Kwazulu Natal province, namely Hlabisa, Port Durnford, Makhathini and Mandlazini (van der Mescht *et al.*, 1997). During that survey, sweet potato was found to be the most important root crop in some areas and the second most important crop after maize (van der Mescht *et al.*, 1997; Thompson *et al.*, 1999). Farmers were found to be using their own vine cuttings and none of them were using virus-free planting materials. This common cultural practice of sharing vine cuttings, as planting materials seemed to promote the spread of infected material from one farmer to another (Karyeija *et al.*, 1998).

The current baseline survey was done in order to include as many provinces as possible so that a true reflection of sweet potato production by small-scale farmers can be obtained based on extensive information. The objective of the survey was to obtain information from farmers on the importance and role of sweet potato in their households. It was also important to know farmer cultivation practices and how they influence virus and diseases spread and to establish the farmers' knowledge on sweet potato viruses, production and constraints. This will also help in understating the farmers' way of farming and the reasons behind their production practices so that a means of improving their sweet potato production can be developed.

3.2 Materials and methods

3.2.1 Survey of farmer's knowledge

3.2.1.1 Approach

A baseline questionnaire to gather information was designed by Sunette Laurie (ARC-Roodeplaat) during the 1996/1997 survey. It was designed to gather information on production and uses of sweet potato. Also the current status of sweet potato production, local farming systems, varietal and taste preferences and constraints to the production of sweet potatoes were addressed. Other aspects such as production importance of the crop versus others crops, production costs, income and marketing were also addressed. This questionnaire was modified for use in the current survey to also establish the farmer's knowledge of virus diseases. The questionnaire is given in Appendix 3.1.

Through collaboration with extension officers of the Provincial Department of Agriculture, areas and farmers growing sweet potatoes within the province were identified. Seven provinces of South Africa (Limpopo, Mpumalanga, Western Cape, Eastern Cape, and Kwazulu Natal, Gauteng and North West province) were identified as sweet potato growing areas. From February 2001 to April 2003, both small scale and medium scale farmers were visited and questionnaires were administered only in six provinces (Limpopo, Mpumalanga, Western Cape, Eastern Cape, Kwazulu Natal and NorthWest). Interviews were not conducted in Gauteng province due to time constraints.

3.2.1.2 Analysis

All data was entered in the Microsoft EXCEL spreadsheet programme in order to group or arrange and to calculate means and percentages.

3.3 Results

3.3.1 Area surveyed

The baseline survey was done in six provinces, namely Limpopo, Mpumalanga, Eastern Cape, Western Cape (Figure 3.1), Kwazulu Natal and Northwest provinces of South Africa. See Table 3.1 for the number of questionnaires conducted. Extension services in the Free State and Northern Cape claimed that very little or no sweet potatoes are grown in their provinces. Therefore these provinces were not surveyed.

Table 3. 1 Areas included during the baseline survey of farmers growing sweet potatoes in South Africa

Province	Limpopo	Mpumalanga	Gauteng	Eastern Cape	Western Cape	Kwazulu-Natal	North West
Areas	Venda Bushbuckridge Nebo	Hazyview Tonga Beversbreed Gutjwa	Cullinan	Alice Port Alfred Bathurst Port St Johns Umtata	Ebenezer Saron Goedverwacht Freemeshein Pacalsdorp	Pietermaritzburg	Hammans-kraal
No. of questionnaires	46	22	0	10	7	3	1

In all the provinces surveyed, most rural farmers did not own a large piece of land for their agricultural activities. The largest farms were 55-100ha but 39% of farmers had ≤ 500m^2 and another 38% had between 5500m^2 and 15000m^2 (1.5ha). Most farmers did not know exactly how big their land size was. Sweet potatoes were found to be cultivated on any piece of land available in the home yard. In most cases, 54.9% grew sweet potato on a land size between 100m^2 and 5000m^2. Other farmers (29.6%) planted between 1-1.5ha and the largest fields were between 20-30ha (5.6%). The average areas where sweet potatoes were found to be cultivated per province were 6631m^2 in Limpopo (n=42), 30506m^2 in Mpumalanga (n=14), 8993m^2 in Western Cape (n=7) and 5000m^2 in North West (n=1) with the overall average of 6679m^2/ farmer. The sweet potato field size was an average 59% of the total field size.

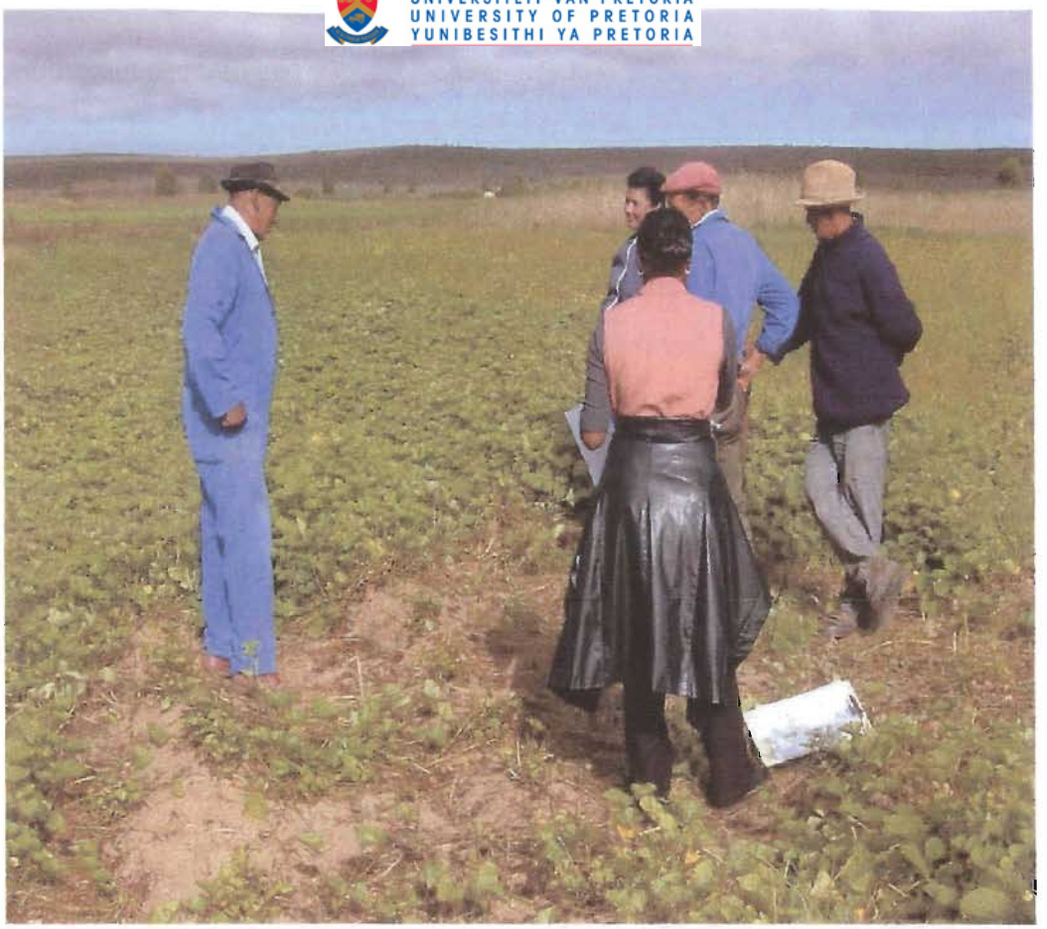

Figure 3.1 Julia conducting a baseline survey of production and utilisation of sweet potato in Western Cape province

3.3.2 Socio economic importance

3.3.2.1 Biographic profile

In all provinces where questionnaires were completed, the majority of respondents were women, comprising 62%, while only 38% were males. Many of the respondents were middle aged, between 41-50 years (38.5%), 31-40 years (27.7%) and between 51-60 years (17%). The oldest were between 61-70 (4.6%) and greater than 70 years (6.1%). The youngest group (6.1%) was between 20-30 years old.

The majority (95%) of farmers grew their crops subsistently and they depended on agricultural activities for their household food supply. Many (73%) of the respondents had been growing sweet potatoes for many years or for their whole lives. Others (19.3%) had been growing it for less than five years.

3.3.2.2 Production objectives

Sweet potato was regarded as a traditional crop by most farmers (40%), whereas 23% grew it for food, while others (25%) saw it as an income-generating crop (Table 3.2). It was also mentioned that the crop was grown for its drought tolerance and adaptation to rough climatic condition characteristics, ease to get planting material and that there is a market for it. Most importantly, the crop played an important role for many farmers by providing food and income generation. For most farmers (81%) the purpose of growing sweet potato was for both consumption and selling to generate income. Only 2% grew the crop for income generation (Table 3.3).

Table 3.2. Reasons for farmers to grow sweet potato

Reasons	LP	MP	KZN	W.C	E.C	N.W	Total	%
Tradition	29	15	3	3	8	1	59	40
Income	19	10	3	3	1	1	37	25
Food	25	7	0	0	1	0	33	23
Climate/drought tolerance	3	1	0	0	4	0	8	5.5
Easy to get planting material	2	0	0	0	2	0	4	3
Good market	1	0	0	2	0	0	3	2
Good at it	0	0	0	1	0	0	1	0.7
Increase soil fertility	1	0	0	0	0	0	1	0.7
Total no. of responses	79	33	6	9	16	2	145	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

Table 3.3 Purpose of sweet potato in the household (Selling, own consumption or income generating)

Purpose	LP	MP	KZN	W.C	E.C	N.W	Total	%
Sell to generate income	0	0	2	0	0	0	2	2.2
Own consumption	1	9	0	5	0	0	15	16.5
Both	45	13	5	5	3	3	72	81
Total no. of responses	46	22	7	10	3	3	89	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.3.2.3 Importance of sweet potato, compared to other crops

As expected, grain crops such as maize were still rated the most important crops for food supply by the majority of farmers (89%) in all provinces surveyed, followed by vegetables with 56% farmers indicating that it was important in their daily diet (Table 3.4). Sweet potato was the third most important food crop, with 48% of farmers showing their need to always have a small patch of the crop in the yard, which was why they did not harvest everything in their fields. Although potatoes and fruits were also mentioned as part of their daily food sources, these two were rated as fourth and fifth most important respectively.

For cash crops, vegetables were rated to be the most important by 79.3% of farmers. Grain crops also brought high returns if climatic conditions such as good rainy seasons were favourable, with 77.7%, farmers indicating that maize was an important cash crop to them. Sweet potato was also an important cash crop to 47% of farmers. Some farmers mentioned that they also exchanged sweet potato for maize. Potatoes and fruits were also sold for cash, but not to the extent that vegetables, grain crops and sweet potatoes were sold.

Table 3.4 Comparison of sweet potato with other crops as food/cash crop in percentages

Crops	As food	As cash
Grain crops	89%	77.7%
Vegetables	56%	79.3%
Sweet potato	48%	47.3%
Potato	23%	10.7
Fruits	10%	12.4%

3.3.2.4 Income

Although the majority of farmers in rural households who were visited indicated that they produced sweet potato normally for their own consumption, it was also discovered that sweet potato could have a potential market in the future. If production constraints such as costs and lack of land were minimised, sweet potatoes could be a good means of increasing household income. The income mentioned by farmers if they were selling their produce is given in Table 3.5. The highest, not usually expected in rural farming, was from Mpumalanga with one farmer claiming that he could get as high as R15000 in a growing season, if production constraints were minimised. For all provinces, the potential average income from sweet potato was found to be R685, a reasonable figure for covering some of the day-to-day expenses that rural people are unable meet.

Table 3.5 Potential income that can be obtained from sweet potato production

Income R	LP	MP	KZN	W.C	E.C	N.W	Total	%
<R100	4	0	0	0	1	0	5	904
R100-R499	14	4	3	0	0	0	21	39.6
R500-R999	11	0	0	0	0	0	11	20.7
R1000-R1999	12	0	0	0	1	0	13	24.5
R2000-R2999	0	0	0	1	1	0	2	3.8
R15000	0	1	0	0	0	0	1	1.9
Total no. of responses	41	9	3	1	3	0	53	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.3.2.5 Yield

Farmers normally harvested enough to feed their family, leaving the plants in the field in order to prolong the availability of sweet potato for the family until the next season. When they sold their products, buckets of between 5kg and 10kg or 20kg crates were used. A very low yield was measured (Table 3.6) with 64% of farmers producing less than 1.0 tons/ha. Some farmers in Mpumalanga achieved a yield as high as 11-20t/ha in a season.

Table 3.6 Yield in t/ha obtained from sweet potato production

Tons/ha	LP	MP	KZN	W.C	E.C	N.W	Total	%
0.1-0.5	11	1	0	1	0	0	13	27
0.6-1.0	17	0	0	0	1	0	18	37
1.1-1.5	1	0	0	0	1	0	2	4
1.6-2.0	3	0	0	0	0	0	3	6
2.1-5.0	4	1	0	0	0	0	5	10
6-10	3	2	0	0	1	0	6	12
11-20	0	2	0	0	0	0	2	4
Total no. of responses	39	6	0	1	3	0	49	
Average	1.6	8.5	0	0.47	3.0	0		

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.3.2.6 Marketing

Sales in rural areas were very irregular. It sometimes depended on whether the farmer had enough for both consumption and selling. Some farmers only harvested as required by the family (piecemeal) at a time and did not consider selling. Those who sold their fresh sweet potato, indicated that prices varied depending on the quantity, size of the storage roots, the place and the people they were selling to and if there were any, inputs price can also be a deciding factor on the price. The price per kg of sweet potato is given in Table 3.7. Most of them (54%) sold at a price between R0.50-R1.00/kg, others (23%) sold at between R1.1-R1.50/kg, while 19% are sold at between R1.60-R2.00/kg. It was only in North West province where 3% of farmers were found sell at a price of R3.00/kg. The overall average price sweet potato was sold for by rural people in all provinces was found to be R1.11/kg.

The majority of farmers (49%) sold to their neighbours, while others (30%) sold to the local markets. Some (15.6 %) sold door-to-door, a way of taking the product to the people. Although it was also mentioned that tourists were also their target markets, it

was not common or practical to the majority of farmers due to lack of transportation of their products to these markets, where they claimed they would sell at better prices. Hawkers, local communities and pensioners also supported rural farmers by coming and buying from them.

Table 3.7 Selling price for sweet potato

Price/kg	LP	MP	KZN	W.C	E.C	N.W	Total	%
R0.50-R1.00	4	7	0	1	2	0	14	54
R1.1-R1.50	1	1	0	4	0	0	6	23
R1.60-R2.00	1	1	3	0	0	0	5	19.2
R2.10-R2.50	0	0	0	0	0	0	0	0
R3.00	0	0	0	0	0	1	1	3.8
Total no. of responses	6	9	3	5	2	1	26	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.3.2.7 Consumption and utilisation

Sweet potato was normally consumed as a fresh product in rural household with farmers getting their sweet potato to eat from their local markets (32%) and hawkers (44%) when they did not have any available in their fields or home yards. Other sources of sweet potatoes for consumption mentioned were friends and families, shops, neighbours, and other farmers having their own supply in their home yards. Sweet potato was boiled and eaten when cold with tea by 58% of respondents in rural communities (households). It was also consumed when first boiled, mashed and formed part of a main meal. Leaves were also cooked and eaten as vegetables in the main meal by some people. Fresh sweet potato tubers were also mashed and eaten with rice, while other farmers boiled them, mashed them, and mixed with them with groundnuts or maize meal. Boiled tubers are also eaten fresh as a main meal. Chips were also mentioned to be some ways of preparing sweet potato.

3.3.3 Cultivation practices

3.3.3.1 Planting material

Sweet potato was a household crop for many rural families, and although some farmers bought their planting material, 47% got their planting materials from neighbours and friends and 30% get them from relatives. Some of the planting materials were kept by farmers (14%) for many years. Although 4% and 2% of the farmers mentioned that they bought their planting materials from shops and vine growers respectively, it is was clear that rural farmers mainly exchanged their

planting material among friends, relatives and neighbours and new varieties that were diseases-free were not used or known. Sources of planting materials are given in Table 3.8. If planting materials were bought, the average cost was up to R35 for a 50kg maize meal bag full of cuttings. Since farmers exchanged planting materials among each other, 69% of farmers did not have a problem in getting planting materials while 31% indicated that it was a constraint because of the high cost involved in getting planting materials. In some areas in Eastern Cape, Mpumalanga and Limpopo provinces, sweet potato is not a common crop and it is not easily accessible. Only 5% of farmers indicated that they preserved their planting materials by storing tubers, planting few tubers in beds and putting some tubers in cool temperatures of ± 15-20°C and used them as planting materials for the next season. The most common harvesting practice was digging sweet potatoes out by hand or lifting them up with a fork.

The majority of farmers (92%) had never received formal training on how to produce or preserve their own planting materials. ARC-Roodeplaat has started at target sites to train people in these aspects.

Farmers were found to plant between two and six varieties. Selection of planting materials was not practiced. Although cultivars such as Bosbok (n=1), Mafutha (n=1), Blesbok (n=3) were mentioned, 89% of farmers used their local land races which they shared among each other. Given a choice, farmers (22%) would prefer varieties with good taste, disease and pest tolerance (15%), high yielding (14%), drought tolerance (14%) and having both high yielding and good taste characteristics. Characteristics such as taste and less fibrous, fast growing and early maturing, medium sized, less cracking, longer storage period, high consumer demand, shape and good skin colour were pointed out to be desirous by farmers. All farmers interviewed showed interest in getting varieties that were improved and virus-free with the hope that they would taste better, yield better, and that they would be able to make money.

Table. 3.8 Sources of sweet potato planting materials

Sources of plant material	LP	MP	KZN	W.C	E.C	N.W	Total	%
Own	6	1	0	5	7	0	18	14
Relatives	38	8	0	1	2	0	39	30
Neighbours/Friends	40	17	0	2	2	0	61	47
Shop	9	4	0	0	1	0	5	4
Vine growers	6	0	0	2	0	1	3	2
ARC-Roodeplaat	0	0	3	0	0	0	3	2
Total no. of responses	99	30	3	10	12	1	129	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.3.3.2 Land preparation

In all provinces surveyed, 59% of farmers ploughed their fields with a tractor while 32% cultivated with a hand hoe. In Limpopo, for example, to hire a tractor was mentioned to be a constraint since it could cost an average price of R540/ $1000m^{2,}$ varying from R125 for $2000m^2$ to R700 for $12000m^{2.}$ Animal traction and spades were also used for cultivating the land. Although few farmers indicated what spacing they used, spaces between the plants and between rows was not a common thing to do in rural farming, and when it was practiced, farmers estimated their spacing using their feet. The general spacing used for sweet potato was 0.3m (60.8%) to 0.2m (30.4%) between plants and 1m (39%) to 2m (57%) between rows.

3.3.3.3 Irrigation

Sweet potato was irrigated by 54% of farmers, but for the rest, it was rainfed in many rural farming systems. The furrows system was most commonly practiced by 49%, followed by 22% of farmers using flood irrigation. Watering cans, hosepipes, overhead sprinklers and micro-irrigations were also used by some farmers.

3.3.3.4 Fertilisation

Applying fertilisers to sweet potato was not commonly practiced by 53.3% of small scale farmers interviewed. Only farmers (46.6%) who had been exposed to some modern farming practices applied fertilisers sometimes. The average price of fertiliser in Limpopo was R122/50kg bag. Many farmers believed that applying fertilisers on sweet potato would affect its taste by making it too watery after cooking. Inorganic fertilisers such as LAN, 2:3:2, super phosphate, 2:3:4, potash nitrate and MAP and organic fertilisers such as kraal manure were mentioned to be used by farmers who fertilised their soils, as a single treatment or in a combination.

3.3.3.5 Beds types

Ridges, flats and mounds were the type of beds that farmers were planting on. Although some of the farmers used a single bed type or a combination of two or three methods, the most common was to plant on ridges, with 63% of farmers choosing it, followed by 33% of farmers planting on flats. A minority of farmers (3%) used the mounds bed type.

3.3.3.6 Weeding and plant protection

Most farmers (69%) in rural areas used hoes, others (30%) weeded by hand, because normally their fields were small. Farmers in Limpopo (n=1) and Eastern Cape (n=1) indicated that they did not weed their fields. In all provinces visited, herbicides were not mentioned to be used to control weeds.

The majority of farmers (90%) did not practice plant protection and those (10%) who did sprayed only for pests.

3.3.3.7 Intercropping and crop rotation

Intercropping was also not a common practice, with 80% farmers not applying it. The few who practiced intercropping used crops such as maize, pumpkins, groundnuts, bambara groundnuts and potatoes.

Crop rotation was found to be practiced by over half of the farmers (54%) interviewed in all provinces. Crops such as maize, pumpkins, groundnuts, cabbage, bambara groundnuts, potatoes, beans, garlic, lucern and onions were mentioned to be used in rotation with the sweet potato crop.

3.3.4 Virus diseases

The majority of rural farmers (96%) had no knowledge of sweet potato viruses, neither knowing what symptoms looked like or how they spread. Although few claimed to have seen symptoms, common insects that spread viruses such as whiteflies and aphids were not known, which makes it clear that rural farmers are highly lacking in knowledge on these aspects.

3.3.5 Constraints to production and utilisation

The major constraints in the production of sweet potato mentioned were pests such as moles and caterpillars. Constraints in production are given in Table 3.9. Over half of the farmers (60 %) indicated that insects that infest storage roots threatened their production by degrading sweet potatoes in such a way that they became unmarketable. Due to lack of proper fencing in some of the households, animals such as goats also tended to bother farmers by eating the leaves. Irrigation water was also a big problem if it was not a good rainy season. Equipment (tractors), planting material, production costs, storage places and markets for selling their products were given as other constraints. As already indicated, land for agricultural activities was found to be small in most of the areas visited, which was also a constraint to production.

Table 3.9 Major constraints in the production of sweet potato

Constraints	LP	MP	KZN	W.C	E.C	N.W	Total	%
Insects	39	13	3	0	3	0	58	60
Diseases	1	0	0	0	0	1	2	2
Irrigation water	9	1	0	0	0	0	10	10
Equipments	6	1	0	0	1	1	8	8.2
Production costs	0	3	0	1	0	0	4	4.1
Expensive planting materials	2	0	0	0	0	0	2	2
Animals (eating leaves)	0	0	0	1	1	1	2	2
Market (for selling the produce)	5	3	0	0	0	0	8	8.2
Land	0	0	0	0	0	1	1	1
Storage places	0	0	0	1	0	0	1	1
Yield	0	0	0	1	0	0	1	1
Total no. of responses	62	21	0	4	6	6	97	

LP=Limpopo, MP=Mpumalanga, KZN=Kwazulu Natal, W.C=Western Cape, E.C=Eastern Cape and N.W=North West province.

3.4 Discussion and conclusion

Although sweet potato has been regarded as a low value crop and has received very low attention in research as a cash crop, our results indicate that it is a very important crop to many rural households. Like in other African countries such as Malawi (Moyo *et al.*, 1999), sweet potato is still perceived as a woman's crop in South Africa. Women play an important role in making sure the crop is available for the family. In order to make other people aware of the importance of sweet potato, varieties that provide important nutrients such as Vitamin A (orange-fleshed) need to be introduced to rural people. It was stipulated that the crop is not only important in consumption, but it helps in generating income and also as a food security crop. Although maize and other grain crops are still the major crops for food supply, sweet potato was ranked the third most

important crop for food supply. The requirements of few inputs for production and easy to manage characteristics add to its advantage as a cash crop.

Although they still use their traditional farming methods, farmers in all provinces indicated their lack of knowledge in making planting material and preserving them as a major constraint. Dissemination of planting material among farmers (friends and families) was found to be common practice in all provinces surveyed. And since most of them harvest piecemeal, the practice results in using the same varieties that are not improved nor virus tested planting material. This aids in spreading diseases and producing low yielding and poor quality crops.

Sweet potato viruses are the most important diseases that threaten the production of sweet potato by lowering the yield and causing cracks in some sensitive cultivars, making them unmarketable. Sweet potato feathery mottle virus (SPFMV) infects sweet potatoes worldwide (Moyer and Salazar, 1989). SPFMV, together with sweet potato mild mottle virus (SPMMV) and possibly sweet potato latent virus, has been reported to occur in South Africa (Jericho and Thompson, 2000). Farmers in all provinces surveyed indicated that they did not know what virus diseases were. This confirms the need for farmers to be trained on plant diseases and how to prevent their spread. Farmers need to be shown through demonstration trials that a better quality sweet potato is produced from virus tested propagation materials. Although land for agricultural activities is still a problem, low yield is also discouraging farmers in continuing growing sweet potatoes.

In order to increase yield, farmers urgently need knowledge in selecting planting materials that are diseases free. Although ARC-Roodeplaat has already started with the initiative of supplying farmers in target rural communities with improved and diseases free sweet potatoes cuttings and teaching them how to grow it, as part of empowering them, there is still much to be done as the knowledge is not yet widely spread. Government extension officers can also play a vital role in disseminating this knowledge. Outreach programmes of teaching farmers some other methods of processing sweet potato will also help by making the consumption of the crop desirable, at the same time increasing its market. Farmers need to be taught to integrate their traditional farming systems with some of the modern methods of farming. Half of the farmers in all areas visited, in all provinces, grow sweet potato on a dry land farming

system. The use of fertilisers before planting (for example) and crop rotation will prevent the depletion of nutrients from the soil, making it possible for the crop to survive and still produce in times of poor rains. Research on cost effective production inputs such as compost and plant extracts that can help control pests still needs to done.

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