CHAPTER 8

CROPPING EFFICIENCY OF FARMERS

8.1 INTRODUCTION

The land is used in variety of ways. There are always alternative ways of utilizing any piece of land (Whiteby & Willis, 1978). The intensity of land utilization (according to Boserup, 1965:15) varies widely throughout the world. It is a complex resource which varies greatly in character, productivity and accessibility from place to place (Hawkies, 1978). Rhenosterfontein, Schoongesicht and Bapo II are in the same district, yet they vary greatly in productivity and character. The available area for all three projects is not utilized fully as there are always unploughed spaces every growing season.

8.2 AGRICULTURAL POTENTIAL

8.2.1 Topography and soil distribution of Makwe district

The topography of Mankwe varies. Certain portions are flat and others are mountainous. According to Anon (1991(b) the altitude of many villages ranges from 1000 - 1200m above sea level. There are rivers that run dry in winter like the Elands, Motlhabe and Kolobeng rivers. In good rainy seasons these rivers will have water throughout summer months. Mountains like Janskop (Molorwe), Matlapeng, Tlhakong and Pilanesburg form part of the beauty of the district

All three projects are situated on a relatively flat area, Rhenosterfontein is sloping north to south and Schoongesicht sloping from south to North.

Figure 8.1 shows broadly the soil patterns of the district. The western part consists predominantly of Red Yellow apedal Soils (Aa-Ai), which are irrigable when irrigation water is available. Crops such as maize and groundnuts can thrive well in these soils. The only limitations with them is that they are subject to wind erosion due to a low clay percentage.

Vertic, Melanic and red structured soils (Fa-Fc) are found mostly on the eastern side. There are small portions on the western side, north and south. Deep red soils are suitable for dryland cropping and irrigation. Pedocutanic soils (Ea) form a strip in the middle of the district. These soils are not ideal for cultivation in drier areas due to high clay percentage. If climate is favourable for cultivated pastures, sunflower and grain sorghum can be cultivated. A large portion of miscellaneous land classes (Ia-Ic) are found in Pilanesburg mountains. It is not usually cultivated due steep to slopes and it is now fenced off for game. It should be noted that in flat areas crops could be cultivated and irrigated. Schoongesicht is situated on Pedocutanic soils (Ea) less than 1000m from Ramohibitsoana village, Bapo II at Bapong village on vertic, melanic and red structures soils, and Rhenosterfontein situated south of Mogwase complex on the same type of soils as Bapo II project

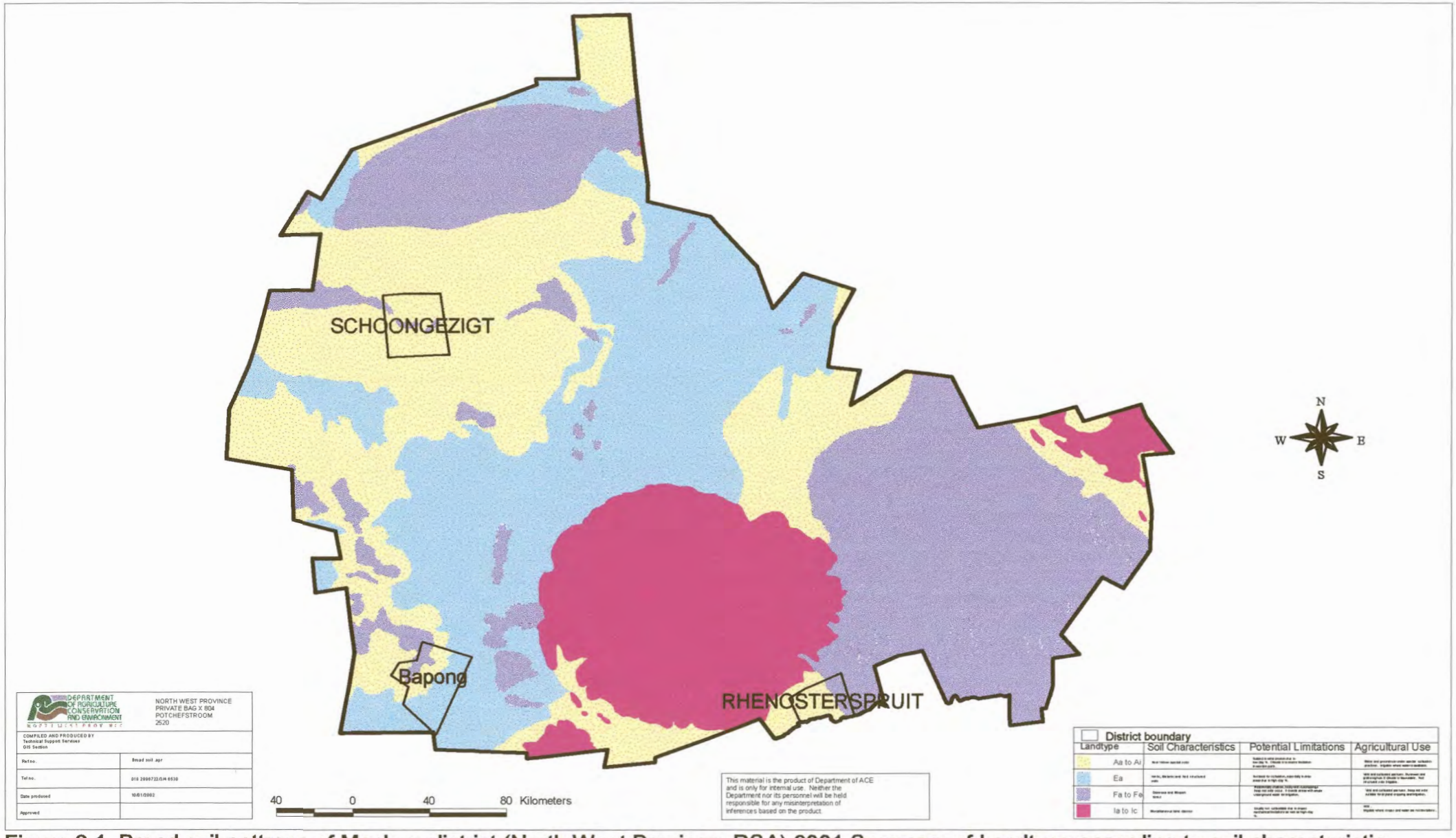


Figure 8.1 Broad soil patterns of Mankwe district (North West Province, RSA) 2001 Summary of Landtype according to soil characteristic

8.2.2 Rainfall distribution throughout the district

The three projects are not located on one side of the district. They are found almost at the pheriphery of the district hence they are subjected to different rainfall. The average rainfall of Rhenosterfontein is 584mm. In Bapo II it is 568mm and in Schoongesicht it is 565mm. Rainfall pattern, intensity and distribution play a major role as far as crop production is concerned. The eastern part of the district has a higher average rainfall than the western and southern part. A better production would be expected from on the east than the rest of the district. Further research is still required to identify the influence of rainfall distribution on production of crops mostly planted in the whole district. Figure 8.2 shows the rainfall distribution in the district of Mankwe.

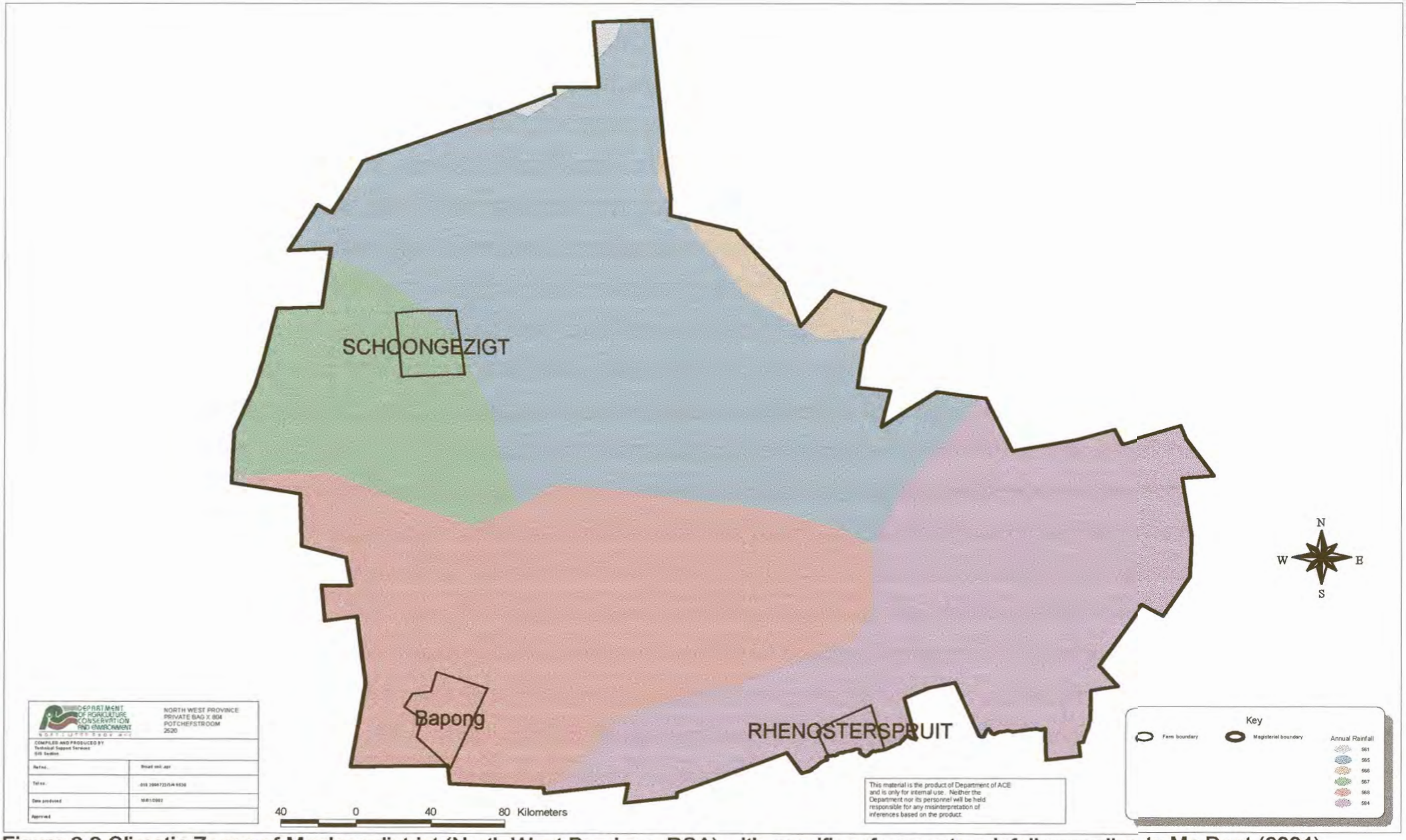


Figure 8.2 Climatic Zones of Mankwe district (North West Province, RSA) with specific reference to rainfall according to Mc Dent (2001)

8.2.3 Soil potential for Maize and Sunflower

Different types of soil in the three projects dictates the type of crop that should be planted. Suitability is the key word, which means high yields with relatively low inputs. Table 8.1 below shows types of crops planted.

Table 8.1 Types of crops planted at Rhenosterfontein, Schoongesicht and Bapo II Projects (1997) (n=26)

Crop	Projects		
	Rhenosterfontein	Schoongesicht	Bapo II
Maize	*	-	*
Sunflower	*	*	*

* Planted - Not Planted

Maize and sunflower are cultivated on the projects according to the suitability of the soils. It should be noted that there is a variety of soils on the projects. McRae & Burnham (1981) gave some points to be considered for a crop to be planted in a particular spot as follows:- 1st the requirements of the crop needs to be known, or alternatively what soil and site attributes adversely influence the crop. 2nd is to identify and to delineate land with the desirable attributes. A soil map makes both steps easier. Observation of crop performance can be related to a particular kind of soil and results extrapolated to all areas of the same soil and climate. Maize is planted at two projects. Sunflower grows in variety of soils ranging from light to heavy soils and larger areas are planted compared to maize. In each case good soil management practices are required to improve soil potential and to enhance yield.

The agricultural potential of a soil can naturally only make sense when it is given in terms of crop production (Fertiliser Handbook, 1989). For example a certain soil can have a low potential for dryland maize production, but a high potential for hay production. Potential must therefore be determined separately for various crops or different situations.

Fertilizer Handbook (1989) classified potential as:- (a) genetic potential and (b) practical potential. Genetic potential is only possible under ideal conditions. In practice only a portion of it can be realised. It is limited or diminished by a number of factors like (i) soil, (ii) climate which include rainfall, rainfall distribution, humidity, wind and temperature, (iii) the farmer and his ability to use production factors in such a way as to obtain maximum from them.

Practical Potential means that factors like soil, climate and man will influence to the definition of yield target, planned yield, optimum yield and maximum economic yield. These terms have one common denominator namely that a yield value is defined as being lower than the theoretical potential, taking into account the limitation mentioned (Fertilizer Handbook, 1989). The farmers should plan according to the average of the actual yearly potential over a number of years. In practice seasonal variations in yield must be expected. It is therefore important for a farmer to have a sound knowledge of the climatic conditions and soil potential of his land to make an informed decision and plan in line with it. Production potential of a specific land should also not be confused with soil fertility.

8.2.3.1 ***Soil potential for maize***

According to figure 8.3 the maize yield is predominantly higher on the western side of the district than the eastern side. There are some portions on the northern side and western side where maize yields are in the range 2001 - 3000kg per hectare. Rhenosterfontein and Schoongesicht fall in the range of 3001 - 4001kg per hectare, while Bapo II fall in the range of 2001 - 3000kg per hectare.

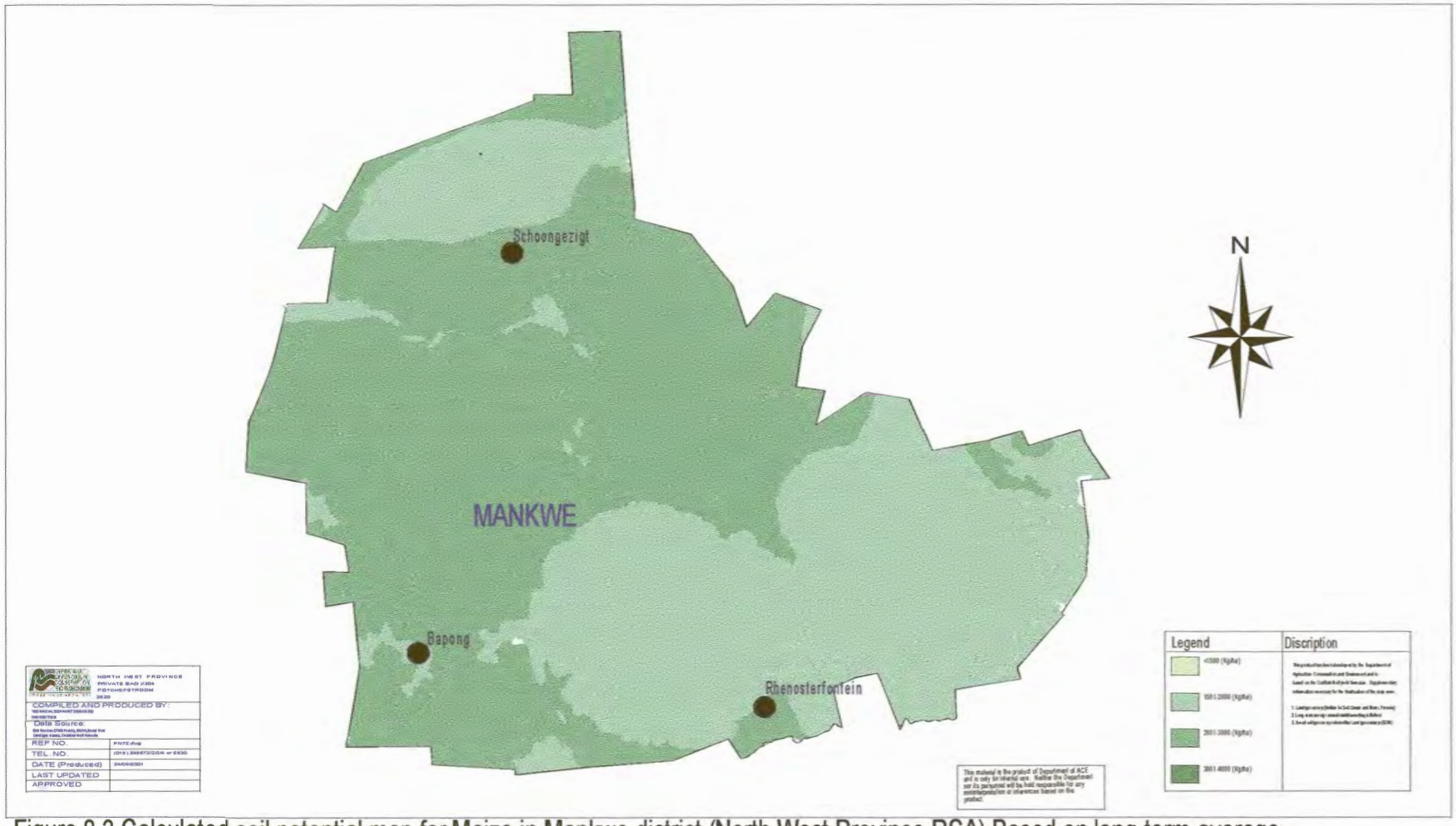


Figure 8.3 Calculated soil potential map for Maize in Mankwe district (North West Province,RSA) Based on long-term average rainfall Mc Dent (2001)

8.2.3.2 ***Soil potential for sunflower***

The potential for sunflower according to Figure 8.4 is higher on the western side than on the eastern side. Yield in the eastern side ranges from 501 - 1000kg per hectare, while on the west the range is between 1001 - 1500kg per hectare. Rhenosterfontein and Schoongesicht fall in the range 1001 - 1500kg per hectare, while Bapo II in the range of 501 - 1000kg per hectare. It should also be remembered that rainfall is higher in the east than in the west. Therefore, it should have been expected that the yields are higher in the east than the west. This suggest that the rainfall is not the only influence on yield.

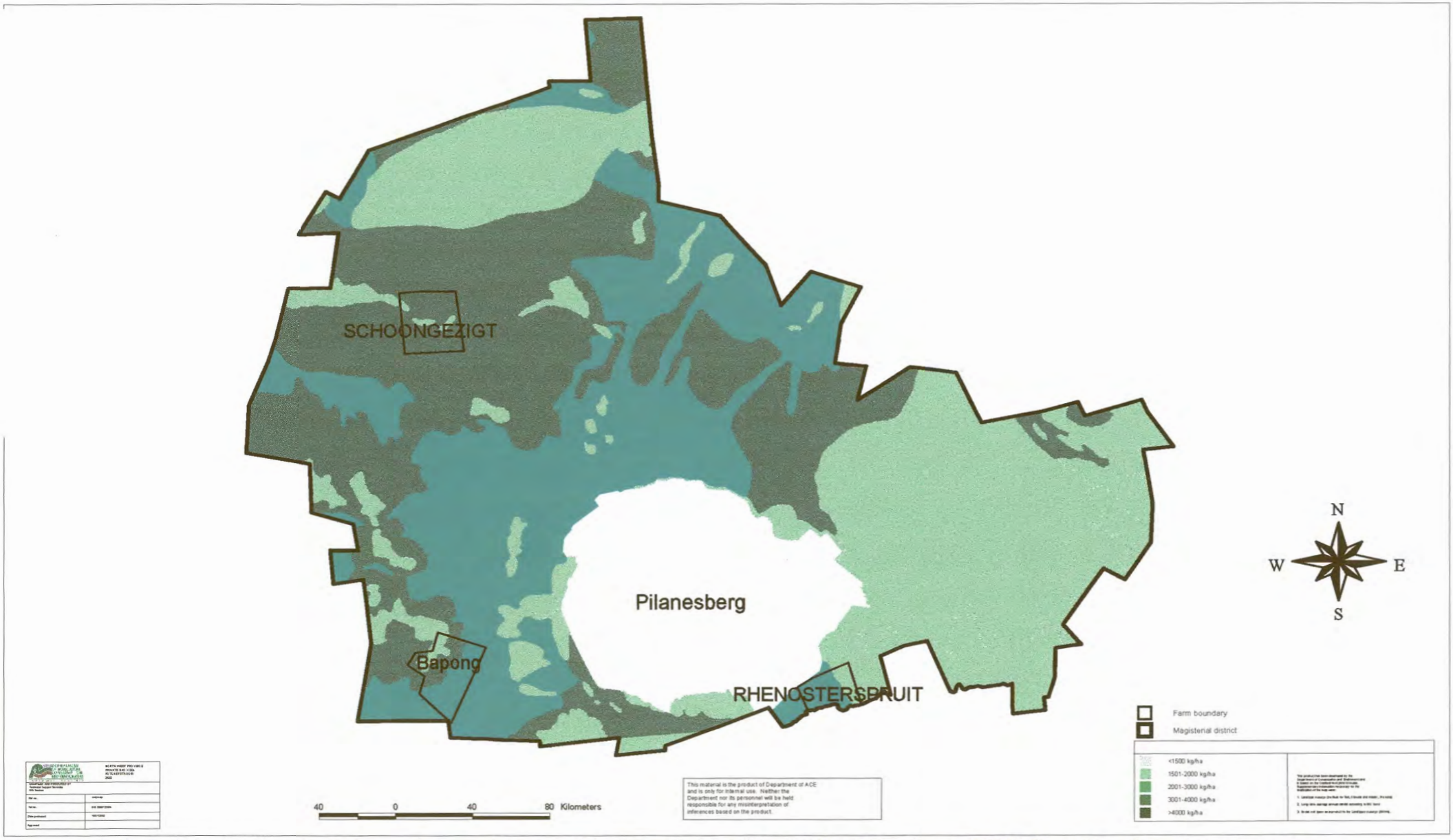


Figure 8.4 Calculated soil potential map for sunflower in Mankwe district (North West Province, RSA) Based on long-term average rainfall Mc Dent (2001)

8.3 UTILIZATION OF AGRICULTURE PRACTICES

8.3.1 Introduction

There are diverse systems of land use, and within each system there are cultural practices that are common. Some farmers, because of financial constraints, are unable to use them. This poses a critical challenge within the context of broader rural development strategies. Land according to Hawkies (1978) is a complex source which varies greatly in character, productivity and accessibility from place to place. It therefore calls for the concept of Laker (1982) of optimum land utilization of each an every area of land to the best advantage of the local people. Crops should be planted on all land suitable for cropping. Suitability means being able to produce high yields with relatively low inputs (Vink, 1960 cited by McRae & Burnham, 1981).

Land cannot be regarded as unproductive or having a low potential until all good agricultural practices are adhered to. One should also take into consideration soil productivity factors like soil properties and factors external to the soil such as choice of crops or cropping systems, rainfall distribution, level of fertiliser use and others (Sanchez, 1993). Land can be used in variety of ways and there are also alternative ways of utilising any piece of land (Boserup, 1965:15; Whiteby & Willis, 1978). The role of extension will then be to facilitate and mobilise farmers to use all appropriate agricultural practices to make the best use of the land. According to Schwartz & Kampen (1992) this could be achieved through working with farmers in a group to extend a best coverage.

8.3.2 Current crop practices

Rhenosterfontein and Bapo II farmers plant maize and sunflower, whilst Schoongesicht farmers plant mostly sunflower. Table 8.2 shows some important aspects of cropping in the three projects.

Table 8.2 Aspects of crop planting practices as implemented by farmers at Rhenosterfontein, Schoongesicht and Bapo II Projects (1997)(n=26)

Crop Practices	Rhenosterfontein	Schoongesicht	Bapo II
Soil preparation	Late Oct. - Beginning Nov.	Dec - Jan	Late Oct. - Beginning Nov.
Planting date - maize	Mid Nov. - 15 Dec.	-	15 Nov.
- sunflower	1st Week Jan. - Mid Feb.	2nd Week Jan. - 20th Feb.	1st Week Jan. - late Feb.
Planting depth - maize	5.2cm	-	5cm
- sunflower	5.3cm	5.6cm	5cm
Planting method - rows	100cm	100cm	100cm
- broadcast	0	0	0
Plant population (density/ha)			
- maize	26000	-	18000
- sunflower	33000	33000	30000
Fertilization (% of total farmers using fertilisers)- maize	83	-	0
- sunflower	33	26	0

8.3.2.1 *Soil preparation*

Sub-soiling to break the plough layer should be done in all projects the number of trips over the land should be reduced

According to Anon (1998), production stability in sunflower could be enhanced by the application of cultivation practices which limit moisture stress as far as possible.

The point of departure in soil preparation should be to utilise rainfall and soil moisture to a maximum. Soil preparation should be focused on decreasing run-off losses, especially in the case of soil with a low infiltration rate.

According to Anon (1998), the aim of cultivation is to break up limiting layers, destroy weeds, provide a suitable seedbed and to break the soil surface at the same time to ensure maximum rainfall infiltration as well as to prevent wind and water erosion.

Farmers start preparing their soils late in October when it begins to rain. At Schoongesicht farmers become very busy between December and January when they prepare to plant. According to Cassini & Cotti (1979) preparation of the maize seedbed should consists of ploughing followed by one or more disking. The plough serves to loosen the soil and bury surface residues and also weed seeds. Chisels, field cultivators, and other implements, which leave plant residues on a rough surface according to Gittens (1982) should not also be used. Approaches to soil tillage differ, some farmers use full conventional tillage and some not Cassini & Cotti, (1979). The number of practices in soil preparation depends upon the soil condition. When the soil is not subjected to compaction, ploughing and harrowing or no-till are enough (Cassini & Cotti, 1979). Snyman (1985) emphasised the importance or benefits of deep ploughing as follows :- (a) It breaks the more shallow plough-plan, (b) improves chemical conditions in a part of the soil, (c) may increase soil volume in which plant roots can proliterate and obtain sub-soil moisture during periods of stress.

8.3.2.2 ***Planting date***

Annual cropping is practised in all projects and it involves ploughing and planting in summer and harvesting in winter. The land is then left unattended between the harvest and the planting of the following season. Planting of maize at Rhenosterfontein and Bapo II projects starts on 15th November - 15 December whilst planting of sunflower on all projects starts between the first week of January until late February. According to Sunflower Production, A Concise Guide (1998), when choosing the best planting date, a number of factors should be taken into consideration. These include the onset and last dates of frost, the soil temperature, moisture requirements of the crop, rainfall pattern and the risk of bird damage.

According to Stoskopt (1981) an optimum date of seeding can be established for each crop. Delays in seeding usually result in yield penalty. Fertiliser Handbook (1989) states that planting dates deviating from the ideal will depress yield potential. To ensure timeliness of planting dates, farmers with large hectares should start planting as early as adequate moisture is available. According to Shude (1997), the planting date of project farmers is correct. They start preparing their land as soon as there is moisture.

8.3.2.3 ***Planting depth***

Planting dept is controlled by the seed size and the type of soil. Another contributory factor is the adjustment of the planter during planting. If the planter is not adjusted correctly by use of the tractor lifts, it may plant too shallow or too deep. It is therefore imperative to ensure that it plants at the desired depth.

Planting by the use of a planter is not the same as planting by hands as one can plant at the same depth throughout with a planter. Since the ground is not always level the tractor driver should keep an eye on the planter to make the necessary adjustment during planting. On average all project farmers plant at a depth of 52 cm for both maize and sunflower. According to Sunflower Production, A Concise Guide (1998), sunflower seeds are planted at a relatively shallow depth. In soil with a high clay content, seeds are planted at a depth of 25mm and in sandy soils 50mm

8.3.2.4 ***Planting methods***

Monoculture is common on all projects. Farmers prefer to plant crops they know best. The practice of monoculture is further entrenched if a crop produces well on a certain piece of land. This makes it difficult for extension staff to convince farmers to change from one crop to another or pursue another direction of multi-cropping or inter-cropping. All farmers prefer to use planters and plant in rows, 100cm apart. According to Shude (1997) planting in rows makes control of weeds and harvesting easy, therefore all farmers were advised to plant in rows and not to broadcast.

8.3.2.5 ***Plant population***

During the survey this was the most difficult question for farmers to answer. 100 percent of farmers at Bapo II, 95% at Schoongesicht and Rhenosterfontein respectively did not know exactly how many plants they plant per hectare. The interviewer had to ask them how far apart their rows were, and what distance apart they put their seed in the rows. The measurements were taken and the interviewer worked out the number of plants per hectare.

They did not even know the implications of such plant population nor the reasons to plant such densities. This simply implies, a heavy task for extension to train in all aspects of cropping. The plant density of 33 000 plants per hectare for Schoongesicht & Rhenosterfontein as well as 30 000 for Bapo II for sunflower is questionable. However, that is the current situation that needs immediate attention. The same applies for maize at Rhenosterfontein and Bapo II with the densities of 26 000 and 18 000 plants per hectare. According to Metcalfe & Elkin (1980) there is no universal plant rate. They pointed out that for maize, normally the range is between 24 710 and 74 129 plants per hectare. A high seeding rate, means more seeds should be bought and more fertiliser be added per hectare, because plants are going to compete for moisture and nutrients. A very low sunflower plant density per hectare of less than 20 000 often limits the yield. A high density of 55 000 plants per hectare and more causes a high occurance of lodging (Anon, 1998). The plant densities of maize and sunflower are within the range of the sensitive zones that could affect the yields.

8.3.2.6 ***Fertilisation***

Fertilisation of crops is still a subject that needs attention. Farmers of the three projects do not take soil samples, they don't know fertiliser requirements of the crop that they intend to plant, they even don't have an idea about fertilisation for a certain targeted yield. 100 percent of all those who apply fertiliser just do it because they believe production will improve. Because of lack of knowledge, there are still those who hold that black soils are rich in plant nutrients and fertilisation is not a requirement. During the survey the difference between the farmers in terms of fertilisation could be observed clearly.

At Bapo II Project fertiliser was not a subject to be entertained, because of financial constraints. At Rhenosterfontein 83 percent of maize producers, 33 percent of sunflower producers as well as 26 percent of Schoongesicht sunflower farmers apply fertiliser (Table 8.2). This practice seems to indicate that these two projects do better than Bapo II. Their production looks very impressive (Figure 8.5). At Schoongesicht yields ranges from 1.4 to 1.6 tons per hectare. At Rhenosterfontein the sunflower yield is 0.8 tons per hectare and maize between 0.8 and 1 tons per hectare for farmers using fertiliser. These yields are however still lower than the calculated potential for maize and sunflower Figure 8.3 and 8.4. The reasons should be further investigated in the normal Extension Programmes of Extension staff.

According to Anon (1989) determination of the yield potential is the starting point for fertilisation planning. Farmers should decide on a realistic, attainable potential, taking all factors like climate, soils, planting time, cultivar, etc. into consideration. Therefore it is important for farmers to apply the correct amount of fertiliser to their crops to avoid a scenario depicted in figure 8.5.

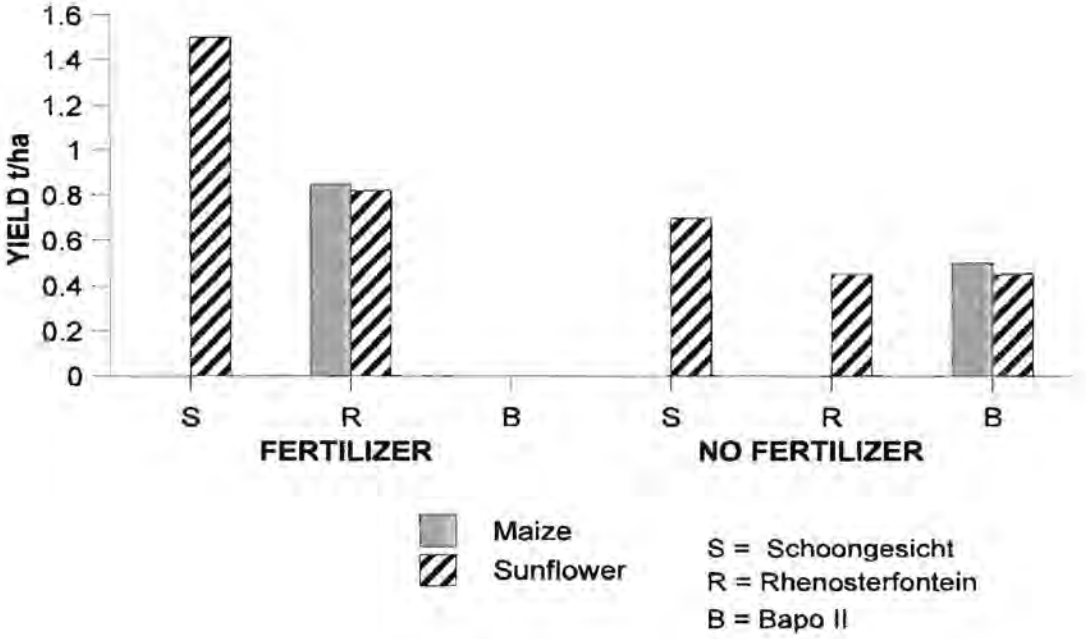


Figure 8.5 Comparison of yield of farmers using fertilizer and those not using fertilizer in the Rhenosterfontein, Schoongesicht and Bapo II Projects(1997)(n=26).

Figure 8.5 shows clear differences in crop yields between the users and non-users of fertilisers on the three projects. There seems to be a relationship between the use of fertiliser and higher yields. This was however not calculated by this study. This needed behaviour change of farmers holds a big challenge for extension staff amidst many socio-economic challenges and obstacles of the farmers.

8.3.2.7 ***Weed and pest control at the three projects***

Farmers do not control pests and diseases. Their reason being that the infestation is not that significant, as a result, controlling them will mean a loss to them. Table 8.3 shows weed and pest control in the three projects.

Table 8.3 Weed and pest control at Rhenosterfontein, Schoongesicht and Bapo II, Projects (1997) (n=26)

Aspects of Crop practices	Weed and pest control by farmers per project		
	Rhenosterfontein	Schoongesicht	Bapo II
Weed control (% of total farmers controlling weeds)			
- maize			
• Hand/ machinery	83	-	100
• Chemicals	-	-	0
• Not at all	0	0	0
- sunflower	0	-	
• Hand/ machinery	17	0	0
• chemicals	100	93.3	0
• Not at all	0	6.7	0
Pest Control (% of total farmers controlling pests)			
- maize	0	0	0
- sunflower	0	40	0

Weeds in all projects are controlled by the use of machinery especially between the rows. In the rows they hire people to control them. Chemicals are not used in any of the projects to control weeds, 100 percent of Bapo II in maize farmers use hands and machinery to control weeds, whist 93.3 percent sunflower farmers of Schoongesicht and 100 percent at Rhenosterfontein use the same method

According to Sollenberger (1986) weeds should be controlled mechanically. Relying on chemical weed control only, will have the result that by summer the weeds will have grown above the crops. On the other hand Snyman (1985(a)) recommended the use of chemicals on the rows where mechanical methods have not reached plant. It is therefore important for farmers to consider both mechanical and chemical weed control to get rid of weeds on their land.

A weed control programme for each crop in each project should be developed. The determining factor in the programme should include the following:- (a) checking the weed spectrum, (b) intensity of infestation (c) soil type, (d) practicability and workability (e) and its viability.

40 percent of farmers at Schoongesicht do control pests, but in the other two projects it seems as if pests are not problematic. During the survey farmers of the three projects indicated that birds and wild animals are the only pests that trouble them. When all of them have planted they share the pests equally.

8.3.2.8 ***Crop harvesting and production inputs***

Table 8.4 shows the percentage of farmers using different methods of harvesting and financing for their crop in the three projects. There is 100 percent hand harvesting of both maize and sunflower at Bapo II. Hand harvesting at Schoongesicht and Rhenosterfontein is low, for example there is 0 percent of sunflower at Rhenosterfontein and 13.3 percent at Schoongesicht.

66.6 percent farmers at Rhenosterfontein and 86.6 percent at Schoongesicht use machinery to harvest sunflower, and only 33.3 at Rhenosterfontein use a combination of both hands and machinery.

Table 8.4 Aspects of crop harvesting, and agricultural production financing at Rhenosterfontein, Schoongesicht and Bapo II, Projects (1997) (n=26)

Crop Practices	Percentage of farmers per project		
	Rhenosterfontein	Schoongesicht	Bapo II
Harvesting			
- maize			
• Hand (H)	20	-	100
• Machinery (M)	40	-	0
• Combination (H&M)	40	-	0
- sunflower			
• Hand (H)	0	13.3	100
• Machinery (M)	66.6	86.6	0
• Combination (H&M)	33.3	0	0
Production inputs			
- cash	83.3	0	100
- credit	16.6	100	0

If farmers use cash for production inputs like the 83.3percent of Rhenosterfontein and 100 percent of Bapo II it shows that they are graduating from a level of dependancy on credit from agricultural banks to a self-sufficiency level. This means that the profit that they get from their produce they are able to buy production inputs for the following year including inputs for soil preparation and weed & pest control. Credit at Schoongesicht project seems to be a way of life, it means they can't do without it. This becomes a challenge for Extension to train farmers on financial management.

The yield that farmers get from their crops in relation to the potential is shown in figure 8.6. It shows that there are a big potential for improvement.

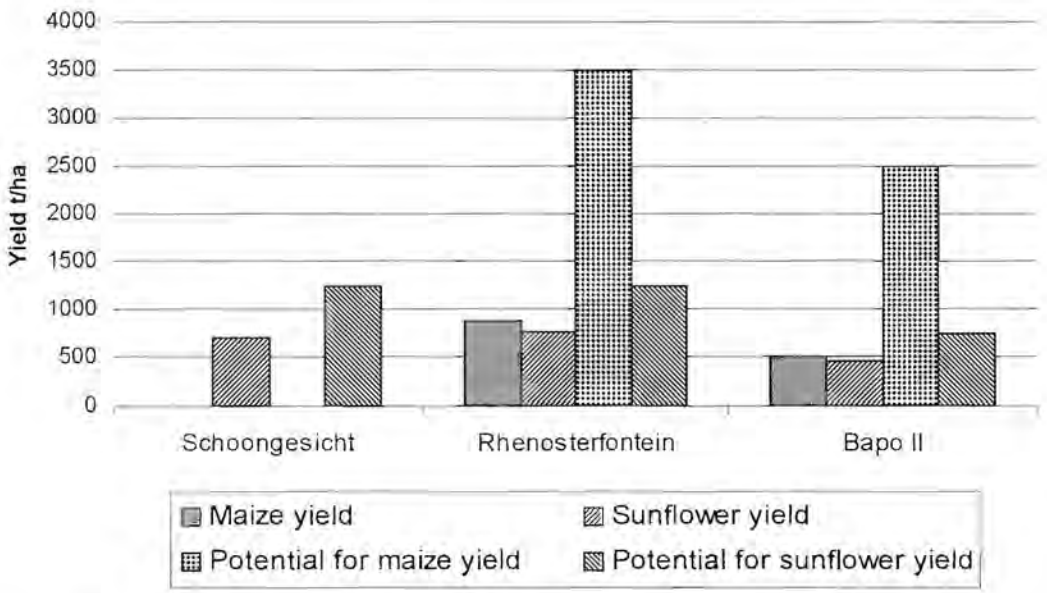


Figure 8.6 Difference in crop yields at Rhenosterfontein, Schoongesicht, Bapo II projects, Mankwe District (1997)

According to Sofranko (1984) the transfer of technology occurs by means of cultural contact. The transfer of technology in the three projects could be:- (i) Training farmers to enable them to use available resources that are at their disposal; (ii) Individual contact - to solve present problems of farmers individually and also guide them, and (iii) group training. If a better technology pertaining to crop practices can be transferred to Schoongesicht project the average yield of 0,69 tons per hectare for sunflower could be improved. Adhere to scientific principles will undoubtedly shift production of the three crops significantly.

8.4 INFLUENCE OF SOME FARMER CHARACTERISTICS ON CROP YIELD

Because of the small number of respondents, no statistical analysis could be made to show the probability of statistically significant interrelationships between personal factors and crop yields. Table 8.5, 8.6 and 8.7 show the relations between yield and personal characteristics such as age, education and farming experience.

Table 8.5 **Relationship between farmers' age and crop yields at Rhenosterfontein and Schoongesicht, Bapo II Projects, (1997)(n=26)**

Age	Average Yield (t/ha)					
	Schoongesicht (n=15)		Rhenosterfontein (n=6)		Bapo II (n=5)	
	Maize(n=0)	Sunflower (n=15)	Maize (n=2)	Sunflower (n=4)	Maize	Sunflower
35 - 44	-	0.1(1)	-	0.6 (1)	-	-
45 - 54	-	0.98 (7)	0.88 (1)	-	-	-
55 -64	-	0.92 (5)	-	1.1 (2)	-	-
65 - 74	-	0.93 (2)	-	0.5 (1)	0.5	0.4
> 75	-	-	1.0 (1)	-	-	-

8.4.1 The Influence of age

From Table 8.5 it seems as if age does not have any effect on yields at Schoongesicht. There is a small effect with sunflower producers at Rhenosterfontein older that 65 years.

Table 8.6 Relationship between farmers' education and crop yields at Rhenosterfontein, Schoongesicht and Bapo II Projects (1997) (n=26)

Education	AVERAGE YIELD (t/ha)					
	Schoongesicht (n=15)		Rhenosterfontein (n=6)		Bapo II (n=5)	
	Maize (n=0)	Sunflower (n=15)	Maize (n=2)	Sunflower (n=4)	Maize	Sunflower
Never Been To School	-	0.1(1)	-	0.74(1)	-	-
Grade 1 - 3	-	0.49 (3)	-	-	-	-
Grade 4 - 6	-	1.04 (1)	-	-	-	-
Grade 7 - 9	-	1.06(7)	1.0(1)	-	-	-
Grade 10 -12	-	0.86 (2)	0.6 (1)	0.7 (1)	0.5	0.45
Tertiary Qualifications	-	2.1 (1)	-	1.05 (2)	-	-

8.4.2 The influence of education

The influence of the level of education of farmers in the three Projects on crop yields are shown in Table 8.6. Their level of education ranges from never been to school, to degree level.

From Table 8.6 it seems as if there could be a positive correlation between the level of education and yield. Many other researchers have found that there is a positive correlation. In developing agriculture Lombard (1992) found that the level of formal training as well as the number of short courses attended have a noticeable influence on behaviour and farming success.

Bermbrige (1992) found with small-scale farmers in Venda that there is a positive correlation between their level of education and their management ability. The absolute importance of training is well illustrated by the citation of Kolbe (1996) : "It must be understood that the person who is not well educated, feels threatened by the onslaught of modern science because he cannot form a good understanding of the real significance of new recommendations and also can not understand how he can benefit from it.

He is thus automatically traditionally orientated and will form resistance to any form of change recommended by anyone outside his social circle". (Freely translated).

The role of the Extension Officer will undeniably be influenced by the level of formal education of the target audience, in this case the members of the three projects. Training programes that will be developed for them should take into consideration their concentration and learning abilities, background and experience as well as their level of education. The use of "learning by doing" methods are strongly recommended.

Table 8.7 Relationship between farmers' experience and crop yields at Rhenosterfontein, Schoongesicht and Bapo II (1997) (n=26)

Experience	AVERAGE YIELD (t/ha)					
	Schoongesicht (n=15)		Rhenosterfontein (n=6)		Bapo II (n=5)	
	Maize (n=0)	Sunflower (n=15)	Maize (n=2)	Sunflower (n=4)	Maize	Sunflower
4 - 12	-	0.8 (9)	-	-	-	
13 - 21	-	0.93 (3)	-	0.9 (3)	0.5	0.45
22 -28	-	0.51 (1)	1.0 (1)	-	-	-
29 -37	-	1.4 (1)	0.88 (1)	0.74 (1)	-	-
38 - 46	-	-	-	-	-	-
> 47	-	0.95 (1)	-	-	-	-

8.4.3 The influence of experience

It is expected that there is a positive correlation between experience and farming success. Table 8.7 shows the relationship of this aspects of this study.

With regard to "years of experience", Table 8.7, this study does not show clear relationships. Lombard (1992) showed however that years of experience are positively correlated to farming success. Experience is a key element in agriculture. For the Extension Officer to be successful he/she must have some experience himself/ herself and will have to know the level of experience of his/ her clients.

8.5 SUMMARY

Cropping efficiency was investigated during the survey, and it was discovered that it is depended on:- (i) Soil Potential, (ii) Climatic Conditions, (iii) Utilisation of Agricultural Practices, (iv) Age, (v) Education and Experience of farmers. The unsatisfactory production of the three Projects is caused by farmers non-adoption of correct agricultural practices like soil preparation, planting date, planting time, planting depth, fertilisation, weed control, pest and disease control. Age of farmers were investigated and did not show any correlation with yield, the same applies to education and experience. The three Projects are situated in soils which have good potential for cropping, Extension has to show farmers the potential of their area through conducting on-farm trials as well as training them.

CHAPTER 9

INNOVATION ADOPTION SITUATION

9.1 INTRODUCTION

Project farmers differ in their needs, interests, stages of development and their perception with regard to recommended agricultural innovation. The Extension officer can gain acceptance if he/she understand the local situation and designs his/her programmes on them. Some of the strengths and weaknesses of rural people's knowledge are impeded in their language and concepts. What is perceived, affects the language evolved to describe it, and language in turn provides concepts and categories that shape perception (Chambers, 1983). The effective use of improved technology/practices by farmers is the immense challenge facing extension (Sigman & Swanson, 1984). The Extension Officer has to face the perception of farmers with regards to different innovations and he/she must present all the aspects of the innovation to farmers in order for them to adopt the new innovations. The perception of farmers on farming practices of the three projects differs significantly and some of the contributory factors here could be age, education, experience in cropping, environmental factors and land suitability. This chapter will look at the perception of farmers on crops and the different agricultural practices.

Table 9.1 shows the number of hectares planted to maize and sunflower in the three projects.

Table 9.1 crops planted by farmers at Rhenosterfontein, Schoongesicht and Bapo II Projects (1997) (n=26)

Crop	Hectares Planted			Total
	Rhenosterfontein	Schoongesicht	Bapo II	
Maize	111	0	15	126
Sunflower	218	847	30	1095
Total	329	847	45	1221

9.2 PERCEPTION OF FARMERS ABOUT CROPS

Schoongesicht is known by farmers as the project that produces good sunflower, and according to them is influenced by black soils dominating in the whole project. The other contributory factor is that sunflower pays more than any other crop. The other two projects have different types of soils, but farmers prefer sunflower over maize. They claim it has a better return than maize. It is clear from Table 9.1 that more sunflower (1095 ha) are planted than maize (126 ha). In each project more hectares are planted to sunflower than maize

9.3 PERCEPTION OF CROPPING INNOVATION

People will only accept new modes of thinking and doing in favour of present ones if the new ones are perceived as offering certain advantages (Compton, 1984). An innovation when it is introduced to farmers, must go through the adoption process before farmers adopt or reject it. Farmers in different localities have different perceptions about different innovations/ practices (Tables 9.2, 9.3, 9.4 and 9.5). Three questions were asked for each and every practice.

9.3.1 The perception of how well they are doing with regard to the crop and the practice

Three questions were asked for each practice. They were asked: (i) what can be done to improve the situation, (ii) what are you going to do to improve the situation and (iii) how well you reckon you are faring regarding different practices under maize and sunflower. Only four practices will be discussed, namely fertilisation, pest control, weed control and handling of crops at harvest. These practices are in most cases not practised by farmers, especially the first three as they believe these increase production costs.

Harvesting is included because it is the last practices that is carried out in the fieled. If it is not carried out correctly greater losses may be incurred. Table 9.2 shows the perception of farmers about the use of fertiliser.

Table 9.2(a) The extent to which farmers use fertilizer in maize production according to their own rating (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	1	16.6	-	-	5	100
1	1	16.6	-	-	0	0
2	1	16.6	-	-	0	0
3	2	33.3	-	-	0	0
4	0	0	-	-	0	0
5	1	16.6	-	-	0	0

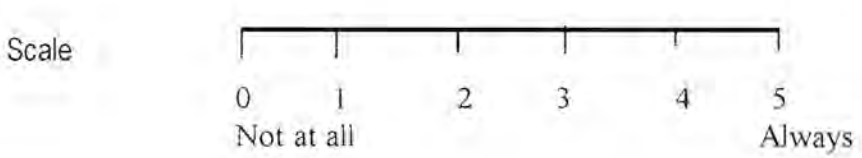


Table 9.2(b) The extent to which farmers use fertilizer in sunflower production according to their own rating (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	4	66.7	7	46.7	5	100
1	0	0	3	20	0	0
2	1	16.6	2	13.3	0	0
3	1	16.6	3	20	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

Scale

0 1 2 3 4 5
Not at all Always

Fertilisation is not yet perceived as important by 66.7 percent of sunflower farmers in Rhenosterfontein Table 9.2(b). Only 16.6 percent sometimes apply fertiliser to their crops. At least 16.6 percent of maize farmers in Table 9.2(a) always apply fertiliser and 16.6 are not applying fertilizer. At Schoongesicht maize is not planted. The perception of fertilisation of sunflower is not good as 46.7 percent of these farmers do not see the necessity of always applying fertiliser (Table 9.2(b)). There are 20 percent who sometimes apply fertiliser. There is no fertilisation application to sunflower and maize at Bapo II project [Table 9.2(a) and 9.2(b)]. This simply means that they will not reach the calculated yield potential of their areas as seen in figure 8.3 and 8.4.

Table 9.3(a) The extent to which farmers control pests in maize (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	4	66.7	-	-	5	100
1	1	16.6	-	-	0	0
2	0	0	-	-	0	0
3	1	16.6	-	-	0	0
4	0	0	-	-	0	0
5	0	0	-	-	0	0

Scale

0 1 2 3 4 5
Not at all Always

According to Metcalfe and Elkins (1980) insect pests may cause annual crop losses averaging 9 percent. That is why it is important for the farmer to identify the real pest that is causing damage to his/her crop. Pests attacking crops in these three Projects ranges from insects to big animals including man. At Bapo II they are not controlling pests in maize and sunflower [Table 9.3(a) and 9.3(b)]. It might be that the damage caused by pests are not significant. A very high percent of 83.3 percent of farmers at Rhenosterfontein having both maize and sunflower do not control pests.

In all projects, except for 13.2 percent of sunflower farmers of Schoongesicht, farmers do not always control pests [Table 9.2(b)]. At Schoongesicht there are 20 percent of farmers who sometimes control pests. Farmers should really control pests well, because pests may reduce yields significantly. This can be done either chemically or mechanically or by just chasing away big pests.

Table 9.3(b) The extent to which farmers control pests in sunflower (1997) (n=26)

Rating	Rhenosterfontein (n =6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	4	66.6	8	53.3	5	100
1	1	16.6	2	13.3	0	0
2	0	0	0	0	0	0
3	1	16.6	3	20	0	0
4	0	0	1	6.6	0	0
5	0	0	1	6.6	0	0

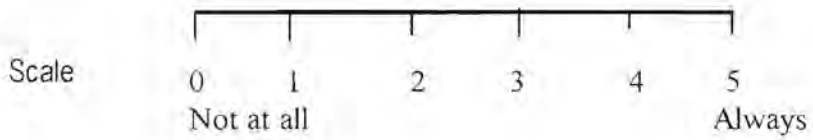
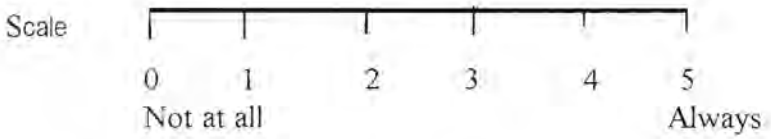


Table 9.4(a) The extent to which farmers practice weed control in maize (1997)(n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	0	0	-	-	0	0
1	0	0	-	-	0	0
2	0	0	-	-	0	0
3	1	16.6	-	-	0	0
4	4	16.6	-	-	5	100
5	1	16.6	-	-	0	0



Weed is a plant that grows anywhere and like any other plant it competes with crops for light, air and nutrients. According to Altieri, Davis and Brorroghs (1983) methods of controlling weeds are cultivation, mowing, grazing, manual control, controlled burning, mulching, competitive crops, intensive crop spacing, inter cropping, crop rotation and timely seeding and transplanting.

Weed control in general in all three Projects is taken very seriously by farmers. The rating of three (3) to five (5) means that all farmers practice weed control and only a 16 percent do it sometimes.

Table 9.4(b) The extent to which farmers practice weed control in sunflower (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	2	33.3	2	13.3	0	0
4	3	50	11	73.3	4	80
5	1	16.6	2	13.4	1	20

Scale

0 1 2 3 4 5

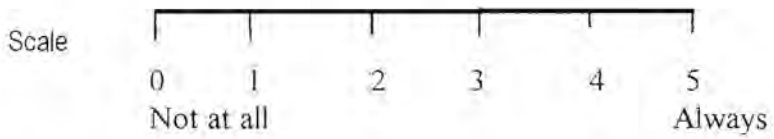
Not at all Always

[Tables 9.4(a) and 9.4(b)] illustrates that, the rating of four (4) to five (5) on this scale is regarded as always controlling weeds. From Table 9.4(b) it is evident that 73.3 percent of Schoongesicht, and 80 percent of Bapo II, and 50 percent of Rhenosterfontein farmers, control weeds. For maize in [Table 9.4(a)] it is 66.6 percent at Rhenosterfontein, and 100 percent at Bapo II who are always controlling weeds. This is a good practices as crops won't compete with weeds for air, light, water and nutrients. At harvest the weed seeds won't reduce the grade of crops. From this date it is evident that weed control as a practice, has been accepted by most of the farmers in the three projects.

Table 9.5(a) and 9.5(b) show the extent to which farmers control foreign material in the grain at harvesting in maize and sunflower

Table 9.5(a). The extent to which farmers control foreign material in the grain at harvesting in maize (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	0	16.6	-	-	0	0
1	1	0	-	-	0	0
2	1	16.6	-	-	0	0
3	1	16.6	-	-	0	0
4	2	33.3	-	-	5	100
5	1	16.6	-	-	0	0



Most crops are harvested at a moisture level between 12-14 percent. With more than 14 percent moisture the crops are still too wet for storage, and below 12 percent the grain is becoming too dry. The drier it becomes the less weight it fetches at the market. For maize and sunflower a combine harvester or hand harvesting could be used. In Table 9.5(a) and 9.5(b) it is evident that most farmers perceive control of foreign material in grain at harvesting as an important practice. They always have a positive attitude towards harvesting their crops.

Table 9.5(b). The extent to which farmers control foreign material in the grain at harvesting in sunflower (1997)(n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=16)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	1	16.6	1	6.6	0	0
3	2	33.3	1	6.6	0	0
4	2	33.3	5	33.3	5	100
5	1	16.6	8	53.3	0	0

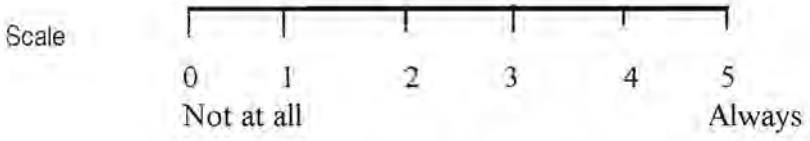


Table 9.5 (a) & (b) shows that 100 percent of Bapo II farmers, and 33.3 percent for both Schoongesicht and Rhenosterfontein farmers, fall in the rating of 4 and are on the alert at the time of harvesting. A lot of money could be lost due to poor harvesting and crop grading.

9.4 VIEWS OF FARMERS REGARDING CROPPING

All farmers of the three projects were asked during the survey about their views with regarding cropping of maize and sunflower in their area. Their views were captured as follows:-

9.4.1 Maize production

"It is a good crop if there is enough rain"

Farmers believe that if there is enough rain, they will get good yields. They are less concerned about other factors that also influence yield like the distribution of rainfall throughout the planting season, soil preparation, pests, weeds and disease control. This simply means that Extension will have to convince them that there are many factors that influence or that have an effect on good yields.

"It needs good management of soil"

Farmers are aware that it is only through good soil management that you can get good yields, starting from soil preparation, fertilisation and weeding. It is quite true that unless you prepare your soil throughly for maize, you won't be able to have a good crop. A well drained seedbed is required for maize and ploughing should be done when it is not too wet or too dry. Primary and secondary implements should be used to break the plough - layer and prepare a fine firm seedbed.

"You can sell maize when green or dry"

Maize can be marketed when green and also when it is dry. Farmers sell a portion of their maize production when green and the greater a portion when it is dry. They feel they make money twice in one growing season, unlike other crops where you have to wait until they are dry. This practices is not always good especially if the farmer is targeting a certain yield. The market for green and dry grains should be evaluated so that efforts to produce maize are channelled to the right direction.

9.4.2 Sunflower production

"Mankwe is a very good area for sunflower. People have been surviving with it".

There is optimism about the production of sunflower in Mankwe. Farmers believe that if they plant it, especially on heavy soil, they will reap a good crop. They are more positive about its growth and development than any other crop. According to them it needs good management. Farmers like to plant sunflower, but they don't target a certain yield. This is the area that needs attention from extension.

"It is resistant to drought"

Farmers believe that if you plant sunflower you will get better returns than maize, because when there is little rain during a particular season, at least you will not go home empty handed. They claim to have survived drought conditions with it.

It is good if farmers have confidence in crops that they plant, because then they will take care of them. They will also apply good management to them, so that they get good returns even if the conditions are not favourable.

9.5 SUCCESS OF FARMERS IN CROPPING

Farmers were asked about their success in farming and to what they ascribe their success . Some of the responses were as follows:-

"Hard working"

Primary and secondary tillage according to the farmers during the survey were a key issue to success. If they are properly done, more than 90 percent germination is expected. Removal of weeds during the critical stage of crop development is equally important. Proper supervision of temporary workers, monitoring of pests and diseases will undoubtedly make a remarkable production improvement.

"Enough and reliable implements"

Crop cultivation is always done with success if there are enough reliable implements. This means implements for soil preparation, weed,- pest and disease control, and machinery for harvesting. Availability of implements enable the farmer to perform his/her duties at the right time.

Good rains

Good crops have been associated with good rain. Farmers were successful, during seasons of good rain. The success of cropping with dry land depends on rainfall. The intensity and distribution of rain is important for growth and development of crops. They usually predict success if there is good rain.

"Planting in time and harvesting early"

Farmers believe that if you plant in time you will harvest earlier than those who planted late. This will give you an advantage in the market. Farmers who once tasted success, because of planting at the right time, usually prepare their land in winter. When the first rain begins to fall they do the final preparation for planting.

9.6 THE EXTENT OF SUCCESS OF FARMERS

Even if farmers are to be successful, the extent of their success will not be the same Table 9.6 shows the extent of success as perceived by the farmers. Their success varies significantly

Table 9.6 The extend of success of farmers of the three projects (1997) (n=26)

Rating	Rhenosterfontein (n=6)		Schoongesicht (n=15)		Bapo II (n=5)	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
0	0	0	1	6.6	0	0
1	0	0	0	0	0	0
2	1	16.6	0	0	5	100
3	2	33.3	5	33.3	0	0
4	1	16.6	7	46.6	0	0
5	2	33.3	2	13.3	0	0

Scale

0 1 2 3 4 5
Not at all Very Successful

From the farmers point of view at Bapo II project farmers are seldom successful with crops. The rating of two (2) clearly shows that they were not successful in their cropping, especially Bapo II project. Schoongesicht and Rhenosterfontein had marginal success.

On average 33 percent of Rhenosterfontein farmers and 13 percent of Schoongesicht farmers see themselves as successful. Even though farmers had constraints as far as their cropping was concerned, they were able to get something from their produce. Only 6.6 percent of Schoongesicht farmers were not successful and this is not very bad. When one compares their yields (success) with the potential of the area, most of the farmers over rate their own success. This could be a contributing factor for them not to accept new innovations. This poses a big challenge for Extension to change their attitudes and beliefs so that they can see themselves as they really are in this study the different perception of farmers was not determined for the different practices and crops.

9.7 SUMMARY

Farmers have different perception about different cropping and cropping practice. Chapter 9 investigates two hypothesis of the study which are (i) to find out if perception of farmers on cropping and cropping practices has an influence on production and (ii) that non-adoption of correct agricultural practices has an influence on production. This study has proved that non-adoption of correct practices does influence yields, for example Table 9.2(b) shows that 66.7 percent of farmers are not fertilising their crops at Rhenosterfontein, 46.6 percent at Schoongesicht and 100 percent at Bapo II. Figure 8.5 has shown that farmers who fertilised their crops got higher yield than those who did not fertilise. High percentages in Table 9.2 (a) and 9.2(b), Table 9.3(a) and 9.3(b) and Table 9.4(a) and 9.4(b), of farmers do not fertilise, control pests and weeds and this again affects production.

Their view regarding cropping of maize and sunflower varied greatly especially in the general management of the crops from soil preparation to harvesting, and this has contributed to the extent of their success in cropping, as shown in Table 9.6. It is therefore important that Extension should know the perception of farmers about cropping and cropping practices so that they draw up programmes which will address their perceptions especially when these are not correct.

CHAPTER 10

THE AGRICULTURAL PRODUCTION CONSTRAINTS IN THE THREE PROJECTS

10.1 INTRODUCTION

The constraints in the three projects are many and of different types. There are constraints which are beyond farmer's control like climatic conditions and those which farmers can group themselves and work them on like pests control, finance, land issues, soils and contractors for ploughing and harvesting. Communication between extension workers and farmers must begin with some understanding of the context in which farmers's live operate their projects and make day-to-day decision to combat farmer's constraints as listed. In this chapter farmer's constraints are listed and described.

10.2 DESCRIPTION OF AGRICULTURAL PRODUCTION CONSTRAINTS OF THE THREE PROJECTS

It is the function of extension to ensure empowerment of farmers and it is the responsibility of extension to combat problems of farmers. For problems of farmers to be solved, they have to be described. According to Düvel (1991) "a problem well put, is a problem half solved" He further said problems should be described in terms of their causes.
The following are production constraints as listed by farmers of the three projects for maize and sunflower:-

10.2.1 **Drought**

The regular occurrence of drought ensures that farmers do not plough yearly, and as a result of this, they are unable to pay all their debts. They reported during the survey that some farmers have not ploughed their land for the past two to three years. Some indicated that they won't be able to plough during 97/98 ploughing season. Some have leased their land to colleagues to plough until further notice.

Drought affects cropping in more than one way. It can cause farmers not to plant in one or two successive seasons. It can also destroy crops that have already germinated, and it can make farmers bankrupt to the extent that they abandon cropping, or lose interest in cropping

10.2.2 **Rainfall**

10.2.2.1 ***Late Rains***

These are the rains that fall when the planting date of a crop is over. Such rains are not beneficial to farmers because there is nothing that they can do. Farmers will have to wait for the following season to plant crops of their choice.

10.2.2.2 ***Early Rains***

Early rains fall before the planting date of the desired crop or just at the time of planting. At the time of planting there is always little rain. Problems with early rain is that weeds germinate early. To control weeds is costly to the farmers who have long prepared their land for planting. This rain may stop to falling when the crops have reached their critical stage of development causing serious crop losses.

10.2.3 **Pests**

10.2.3.1 ***Insects***

Maize stalk borer is a cause of concern for the farmers. They indicated that although they could see that it was troubling them, to control it chemically was costing them more than the damage it done to the crop. Maize stalk borer should be monitored and controlled to avoid unnecessary yield losses. It is also important to look at the rate of infestation before chemical control can be considered.

10.2.3.2 ***Large Animals***

At the time of the survey the farmers were complaining that the Parks Board is not doing enough to help them to control wild animals. According to the law they are not allowed to kill them. They can only chase them away. Wildlife is a serious problem to crops, especially baboons. The only way to control them is to discuss and work out a strategy with the Parks Board as to how they can reduce the rate of infestation.

10.2.4 **Weeds**

Datura Stramonium and *Datura Ferox* are the most problematic weeds in the three projects. They are strong competitors of crops planted in the three projects. Farmers use tractors and spring time harrows to control weeds between the rows. For the rows they use hand hoeing. To control weeds properly, timing for weeding is very important. Weeds should be controlled before they pose a serious problem to crops, especially during development of a crop. When the crop has reached its physiological maturity and yield forming organs have developed to their maximum potential, weeds cannot have any serious effect on yield. They will only be a hindrance during harvesting.

10.2.5 Soil

The farmer's problem is waterlogging especially on heavy soils when it has rained a lot. On light soil the problem is quick drying. The issue of waterlogging is serious at Schoongesicht. To solve this problem it needs the attention of a Crop Scientist and Soil Conservation Technician. There is little that can be done to prevent quick drying of light soil at certain areas of Rhenosterfontein and Bapo II projects. On this soil, Scientists should give advice on the type of crop to be planted and when and how to cultivate them.

10.2.6 Land Ownership

Farmers started the projects cultivating pieces of land allocated to them since the projects were established. According to them they want to be the owners of their property. This problem can only be solved through the different Land Redistribution Programmes of the Department of Agriculture and Land Affairs.

10.2.7 Low Yields

Farmers are experiencing low yields and the contributing factors according to them is poor germination as a result of lack of sufficient rainfall at planting. What they are saying is partly true. Yield is not only affected by one factor as they say, it is affected by soil preparation, fertilization, weed control, pest and disease control, density of plants per hectare and cultivar choice. The experience of the farmer also plays a major role as far as yield of crops is concerned. This is now the challenge of extension to make farmers aware of all the factors that affect production.

10.2.8 Contractors

Farmers who do not have in plough and plant for them. In most cases they hire their colleagues who also have to plough and plant their own land. These contractors usually help them after they've finished with their own land.

The problem with them is that they usually start to help them late, the quality of job at times is not satisfactory. The solution to this problem is for farmers who do not have implements to start buying their own so that they attend to agricultural activities at the right time.

10.2.9 Finance

Finance is one of the biggest constraint of farmers. Although there are farmers who are using cash especially 100 percent of Bapo II, finance is still a limiting factor. Farmers rely on loans from financial institution to buy diesel, seeds and fertilisers. If it doesn't rain as they expected, it becomes big problem for the farmers because it means they cannot pay back their debts.

Those who use cash will have problems to plough and plant the following season. This problem is not easy to solve at present. It needs time and proper programmes to help farmers.

10.3 SUMMARY

The study did not cover in detail all production constraints of the farmers. The major constraints identified during the survey were:- (i) Drought, (ii) Rainfall, (iii) Pests, (iv) Weeds, (v) Soils, (vi) Land ownership, (vii) Low yields, (viii) Contractors and (ix) Finance. The listed constraints caused a reduction in number of farmers cropping in the three Projects. Planning and proper programme development by Extension is essential to assist the farmers to make success out of all production constraints facing them.

CHAPTER 11

CONCLUSION

Projects are normally the focal point of government action, therefore, the goals of most government rural development projects according to Honalde & Rosegard (1983) are to :- (a)benefit the people in the rural areas and (b) contribute to the overall development of the country. Its success is dependant upon many groups of people operating in some kind of coordinated manner. The three projects were established by government as described by Honalde & Rosegard (1983). Forty six (46) farmers benefited, thirteen (13) from Rhenosterfontein, twenty five (25) from Schoongesicht and 8 farmers from Bapo II village.

The study was motivated by the fact that there is considerable potential for increased production, but the status of the projects was unsatisfactory.

The objective of the study was therefore to analyse the situation of the projects, describe solutions to agricultural constraints, to discuss communication networks, and analyse Extension messages to farmers and map out how to change the situation in each project.

Production is the most critical factor in all projects. The study therefore targeted to investigate Communications, perception of farmers on cropping, and cropping practices and non-adoption of correct agricultural practices that could have an influence on yield. The questionnaires was designed and farmers were interviewed in line with objectives of the study and its hypothesis. The questionnaires focused on communication within the projects.

It was also focusing on objectives of the study. The only limitation with the questionnaire was that, it did not cover in detail the production constraints of the farmers and the views of Extension workers about how farmers perceive cropping and cropping practices, so that in the end we examine the point of view of both farmers and Extension workers on some agricultural practices. Further research is required to investigate the limitations of the questionnaires.

Chapter 6 investigated two hypothesis which are (i) No significant extension occurs, (ii) opinion leaders have an influence on decision making.

In as far as analysis and discussion on communication networks within the three projects is concerned, Tables and figures in chapter 6 were drawn to show communication networks and messages from extension to farmers. The wheel type of Bapo II project demonstrate the centrality of decision making. The all-channel network that was found at Rhenosterfontein and Schoongesicht, provides the optimum in member participation, that is everyone talks to everyone else. It allows a farmer to make decisions through consultation with as many colleagues as possible. When one considers the extent to which farmers accept advice from opinion leaders, it is clear that in all three projects the highest percentage was found between the rating of 4 and 5. That means that farmers consulted their leaders and implemented ideas that they felt were relevant and good. Table 6.2, 6.4 and 6.6 shows that opinion leaders have an influence on decision making.

According to the farmers they received very little to nothing from Extension Officers with regard to information messages on agricultural practices as evidenced by Table 6.7(a) & (b) and 6.8(a) &(b). From these tables it shows that no significant extension occurred in the three projects.

All though not covered by this study, it will be important to know why Extension is under performing in the eye of the farmers.

Cropping efficiency was investigated during the survey, and it was discovered that it is depended on - (i) Soil Potential, (ii) Climatic Conditions, (iii) Utilisation of Agricultural Practices, (iv) Age, (v) Education and Experience of farmers.

The unsatisfactory production of the three Projects is caused by farmers not-adopting the correct agricultural practices like : soil preparation, planting date, planting time, planting depth, fertilisation, weed control, pest and disease control. As a result of not adhering to good practices, farmers end-up not producing yields which are in line with the soil potential for maize and sunflower in the three Projects. The age of farmers was investigated and did not show any correlation with yield in this study. The same applies to education and experience.

The three Projects are situated on soils which have good potential for cropping. Extension has to show farmers the potential of their area through conducting on-farm trials as well as providing training.

Farmers have different perceptions about different cropping and cropping practices. Chapter 9 investigated two hypothesis of the study, which are (i) find out if perception of farmers has an influence on production and (ii) that non-adoption of correct agricultural practices has an influence on production. This study has proved that non-adoption of correct agricultural practices and perception of farmers about correct agricultural practices does influence yields. Table 9.2(b) shows for example that 66.7 percent of farmers are not fertilising their crops at Rhenosterfontein, 46.6 percent at Schoongesicht and 100 percent at Bapo II. Figure 8.5 has shown that farmers who fertilised their crops got a higher yield than those who did not fertilise.

High percentages of farmers in Table 9.2 (a) and 9.2(b), Table 9.3(a) and 9.3(b) and Table 9.4(a) and 9.4(b) do not fertilise, control pests and weeds, and this has affected production.

The study did not cover in detail all production constraints of the farmers. The major constraints picked-up during the survey were:- (i) Drought, (ii) Rainfall, (iii) Pests, (iv) Weeds, (v) Soils, (vi) Land ownership, (vii) Low yields, (viii) Contractors and (ix) Finance.

The listed constraints caused a reduction in the number of farmers cropping in the three Projects. Planning and proper programme development by Extension is essential to assist the farmers to successfully overcome all production constraints facing them.

The efforts of Extensions in Mankwe should be directed to improve the quality and standard of living of the farmers.