

S P
GEOGRAPHY
1994/95

THE UNIVERSITY OF ZAMBIA
SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY

ADOPTION OF IMPROVED AGRICULTURAL TECHNOLOGY AMONG
SUBSISTENCE/SMALL SCALE FARMERS; A CASE STUDY OF KANCHOMBA
IN CHOMA DISTRICT.

BY
HAMEJA DENNIS
(91018668)

SUPERVISOR: MR KAJOBA, G.M.

SING: *gumeyoh*

6421 Project Report Submitted to the Geography Department,
School of Natural Sciences in Partial Fulfilment of the
Bachelor of Arts Degree with Education.

OCTOBER 1995

(1)

DECLARATION

"I HAMEJA DENNIS declare that this project has been composed by me and that the work recorded is my own. All maps and diagrams were drawn by me, and all quotations have been distinguished by quotation marks. The sources of all materials have been specifically acknowledged and the project has not been previously submitted for an academic award".

Signed: _____

Hameja

Date: _____

02/10/95.

DEDICATION

Dedicated to my beloved Julita, Chipu, Choolwe and my parents, Mr Simon Cheepa Hameja (late) and Mrs Margaret Mweemba Hamaja, for their love and encouragements, I have been able to prosper.

May the Lord bless you, abundantly.

ACKNOWLEDGEMENTS

This project would not have been completed without the help I received from a number of people. It is not possible to mention all the names of the people that assisted me during the formulation of this project. However, their help has been greatly appreciated.

Firstly, I am particularly thankful to my Project Supervisor Mr. Kajoba, G.M. for the kind advice and many useful suggestions.

I would like also to thank Dr. Mulenga, M.C., the course coordinator and other members of the Geography Department for the help.

To Mr. Mweemba, D.S., the agriculture extension officer and the farmers of Kanchomba, I say thank you for being so willing to answer my questions during the interviews.

Finally, my special thanks go to Julita, Grace and Pheluna for the help rendered in one way or the other during the collection of data.

ABSTRACT

The adoption of modern methods of agriculture in Zambia among small-scale farmers involves a process of trial and error. It is a complex issue characterised by a process of moving forwards and backwards, until one makes a final decision. Small-scale farmers readily accept the new idea when it is socially and economically beneficial to them and does not involve a lot of risks.

The discussion of results have revealed that there has been a tremendous increase in the sphere of adoption of improved methods of agriculture since the colonial period, involving the use of chemical fertilisers, hybrid seeds, improved implements such as ploughs, hurrows, cultivators etc. The increase in adoption have been facilitated partly as a result of European settler farmer's influence, and also due to the provision of subsidies by government, which enabled farmers to purchase the inputs at affordable prices. Adoption has also been encouraged through extension, credit and marketing policies since independence.

The Research findings also show that farmers use traditional methods of cultivation involving the use of hoes, axe, kraal manure and non-hybrid seeds, due to inadequate funds to purchase the best inputs. Further, it shows that farmers in Kanchomba, also face a number of

problems such as late rains and delivery of inputs, lack of capital to purchase the inputs and repair the implements; and persistent droughts.

This project, therefore attempts to investigate the spatial extent of diffusion of modern agriculture methods and their effects on production, among the small-scale (subsistence) farmers of Kanchomba in Chomba District.

problems such as late rains and delivery of inputs, lack of capital to purchase the inputs and repair the implements; and persistent droughts.

This project, therefore attempts to investigate the spatial extent of diffusion of modern agriculture methods and their effects on production, among the small-scale (subsistence) farmers of Kanchomba in Chomba District.

problems such as late rains and delivery of inputs, lack of capital to purchase the inputs and repair the implements; and persistent droughts.

This project, therefore attempts to investigate the spatial extent of diffusion of modern agriculture methods and their effects on production, among the small-scale (subsistence) farmers of Kanchomba in Chomba District.

TABLE OF CONTENTS

Contents	Page
Declaration.....	i
Dedication.....	ii
Acknowledgements.....	iii
Abstract.....	iv
Contents.....	vi
CHAPTER ONE	
1.0 Introduction.....	1
1.1 Statement of the problem.....	5
1.2 Rationale.....	6
CHAPTER TWO	
2.0 Literature Review.....	7
2.1 Characteristics of Subsistence farms....	7
2.2 Choice of agricultural technology.....	8
2.3 Farming systems in Zambia.....	9
2.4 Diffusion of innovations.....	10
2.5 Adoption of improved farming techniques.	13
CHAPTER THREE	
3.0 Location and description of the study area	20
3.1 Location and infrastructure.....	20
3.2 Physical features.....	20
3.2.1 Climate.....	20
3.2.2 Geology and Soil.....	24
3.2.3 Vegetation.....	24
3.3 Socio-economic activities of the study area	26
CHAPTER FOUR	
4.0 Methodology.....	27
4.1 Data Collection.....	27
4.2 Sampling procedure.....	28
4.3 Characteristics of sample.....	28
4.4 Problems encountered.....	28
CHAPTER FIVE	
5.0 Research findings and data analysis.....	30
5.1 Social-economic characteristics.....	30
5.1.1 Gender.....	30
5.1.2 Age of farmers.....	30
5.1.3 Level of education.....	31

5.1.4 Marital status.....	30
5.1.5 Household size of respondents.....	31
5.2 Farm inputs.....	32
5.2.1 Farm implements.....	35
5.3 Labour.....	37
5.4 Land-se.....	38
5.5 Crop production.....	40
5.6 Centre of innovations.....	45
5.7 Extension services.....	46

CHAPTER SIX

6.0 Discussion, Conclusion and Recommendations	49
6.1 Discussion of results.....	49
6.2 Conclusion.....	54
6.3 Reconmmedations.....	56
Bibliography.....	58
Appendix.....	60

LIST OF TABLES

	Page
Table 1. Farmer's level of education.....	31
Table 2. Farmer's household size.....	32
Table 3(a) Farm implements used by farmers in the pre-independence period.....	36
Table 3(b) Farm implements presently used by farmers	36
Table 4. Source of labour on the farm.....	38
Table 5. Land presently owned by farmers.....	39
Table 6(a) Hybrid seeds farmers used in the pre-independence period.....	41
Table 6(b) Hybrid seeds farmers presently use.....	41
Table 7. Common crops grown.....	42
Table 8. Maize production in ten villages.....	43
Table 9. Sell of produce	45

LIST OF FIGURES

	Page
Figure 1. Shows Choma District in Southern Province	21
Figure 2(a) Location of Kanchomba in Choma District	22
Figure 2(b) Shows Kanchomba the study area.....	22
Figure 3. Shows mean annual rainfall in Zambia.....	23
Figure 4. Shows soil distribution in Zambia.....	25

CHAPTER ONE

1.0 INTRODUCTION

The aim of this research is to find out the spatial extent of diffusion of modern agricultural methods among small-scale farmers and their effects in production. The objectives are:

- (i) to find whether small-scale farmers in the study area have adopted modern agricultural methods;
- (ii) to examine whether the available technology have sustained the growth of agricultural production;
- (iii) to examine whether the farmers who have adopted the new practice use also the traditional technology either on temporal basis or permanently;
- (iv) to investigate whether the less advanced subsistence farmers do copy the adopted methods from the advanced farmers;
- (v) to find out problems faced by small-scale farmers in adopting improved agricultural technology.

Subsistence farmers in Kanchomba can be termed as the more privileged peasants in Zambia because they have had access to a wide array of technology since the colonial period. This is a result of the presence of the Kanchomba agricultural camp which was established in the region during the colonial era around the 1930s.

The Annual report of the department of Native affairs (1934) argues that the state through the department of agriculture had by 1936 developed the "Kanchomba system" on the plateau designed to deal with soil infertility in peasants' fields. This system basically involved rotation, construction of contour ridges and application of kraal and compost manure. Further, the annual report states that peasants in Kanchomba were eager to adopt the new technology and often did so after one or two demonstrations.

The department of Native affairs (1934) also observed that when models such as ploughs, scotchcarts, wagons etc, were first exhibited at Kanchomba agricultural station in the late 1930s, they generated a lot of excitement among peasants. Similarly, the demonstration crops at the same station, showed advantages against those cultivated by the ordinary villagers and this considerably impressed them.

There is no doubt that the peasants of Kanchomba were increasingly taking interest in improved methods of agriculture. Therefore, it is hoped that adoption of modern methods of farming have not only changed the traditional patterns of farming but have also increased production thereby raising and improving the standard of living of the rural masses.

Chipungu (1987) argues that as more peasants adopted the Kanchomba system, and as more peasants saw the value in improved methods in the 1940s, crowds at the shows grew

larger, such that by the late 1940s, the most successful agricultural show for Africans was annually held at the Kanchomba Agricultural Station, the institution that had become widely perceived by the plateau Tonga as the place where one could learn about Modern Agriculture.

Similarly, there were other agricultural stations that were famous apart from Kanchomba agricultural station in Southern Province. These stations were located at Mapangazia and Magoye, and had similar objectives as that of Kanchomba. These three stations together with Monze Agricultural Training School which was established in 1948 did their best, both in the 1930s and 1940s, in improving methods of farming among small-scale farmers in Southern Province. Therefore by 1950s, the plough on the Tonga plateau was no longer a new invention but it was nonetheless the main implement for the most peasants. Peasants could now also hire tractors although this was considered expensive for most of them.

Between 1953 and 1963, during the federation of Rhodesia and Nyasaland, the innovations in peasant agriculture tended to reflect the interests of the colonial state. The state expanded its technical facilities, and instituted various agricultural schemes that were designed both to increase peasant output and serve as a basis for rural agricultural extension. These schemes includes the African peasant farming scheme which was introduced in 1948.

The Ngwezi settlement scheme was established during this period in Southern Province with the sole aim of improving peasant farming techniques to reduce soil-erosion.

Similarly, after independence, both in the first and second republics, the government of Zambia instituted various measures to improve farming methods among subsistence farmers. For instance, the state radically changed arrangements for the provision of credit by establishing the credit organisation of Zambia (COZ), Lima Bank and Zambia Co-operative Federation - Finance Service (ZCF-FS). These organisations were widely given liberal regulations so that credit became widely available. Extension services, credits, pricing, subsidies and marketing policies were all used to encourage agricultural change among subsistence or small-scale farmers in Southern Province since independence. Similarly, in this liberalised economy, the adoption of improved agricultural technology in Southern Province in which maize is a major cash crop has been facilitated by government extension efforts in association with donor agencies. This includes the provision of technical information on how subsistence farmers can best manage their farming activities with respect to fertiliser application, choice of seed varieties, planting, weeding, harvesting and storage.

1.1 Statement of the Problem

The adoption of a new idea or practice within a given society is a complex issue characterised by a process of moving forwards and backwards, until one makes a final decision.

As a result subsistence farmers cannot produce enough for the market despite the availability of improved agricultural technology in place. To some extent, traditional attitudes and values have got great influence on the adoption process. Therefore, this research is partly highlighting the problems or constraints that farmers face in the process of adopting a new idea or practice, and also attempts to give solutions to the problems. The research questions therefore are: Have small-scale farmers around Kanchomba adopted improved technology which includes the use of chemical fertilisers, ploughs, hybrid seeds, etc? What have been the constraints and solutions in this process of adoption? If there are no problems or constraints in adopting improved methods, has the new technology benefited farmers? and finally, what are the future prospects if any, in the adoption of modern methods of agriculture?

1.2 Rationale

It is important to undertake this research because it highlights the prospects, risks, problems, constraints and processes involved in the adoption of modern methods of

agriculture. Secondly, such a research helps us to bring forward the solutions to the problems that farmers face in light of the changing environmental conditions with regard to the adoption of improved agricultural methods.

For instance, the low production in agriculture has been attributed to the failure by subsistence farmers to adopt improved farming methods without effectively taking into account the changing environmental conditions (such as low rainfall, deteriorating soil conditions etc) in which farmers live. These are some of the most important issues that such a research should bring forward and this research attempts to put forward some of the solutions with regard to the problems faced by farmers in their adoption process.

Therefore, this research project undertakes to assess the adoption of improved agricultural technology among small-scale farmers, specifically in Kanchomba area, and is organised as follows:- Chapter Two gives the background information to the study. Chapters Three and Four deal with location and description of the study area; and the methodology used during the collection of the data respectively. Chapter Five presents the research findings and finally, Chapter Six deals with the discussion of results, conclusion and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Characteristics of subsistence farmers

Subsistence or small-scale cultivators are farmers who still rely to a significant extent on hand cultivation, without using improved seeds and substantial quantities of fertiliser. These farmers grow food crops for domestic consumption only and in cases of a surplus produce can be sold to raise capital, but selling is not the farmer's aim.

Wolfe (1966, p.3) defines subsistence farmers as "rural cultivators who raise crops and livestock in the countryside, and do not operate enterprises in an economic sense but run households and not business concerns". They use small plots of about five hectares which are cleared using family labour or sometimes hired labour. In some areas weeding and planting are traditionally women's jobs while in other areas, this is not the case especially where there is the use of animal draft power.

Therefore, for the purpose of this Research, "a subsistence farmer is one who does not regularly sell more than half what he produces" (Ranger, 1972, p.39). At this point it is worthy pointing out that these subsistence (small-scale) farmers own a few livestock partly as insurance against crop failure.

2.2 Choice of agricultural technology

Small-scale (subsistence) farmers somehow, and apparently without significant difficulty, choose the portfolio of technology they will use. Certainly the choices are made under differing influences of culture, tradition, and environment in various parts of the world. The mechanism of choice are doubtless varied also, and the number of technology choices available differs greatly among farmers and regions. Moock (1986, p.59) says, "There is abundant evidence of the ability and willingness of small farmers to respond to new agricultural technology provided that it is socially and economically beneficial to them, does not contain unacceptable levels of risks and does not require complementary inputs which are not obtainable".

Further, in cases where the proposed technology is not beneficial and entails important risks to the reliability of food supplies or requires additional inputs that a farmer cannot afford, the adoption of new technology has been very limited. However, the appropriateness of new technologies clearly depends not only on the extent to which they increase the productivity of household resources used in farming but also in a comparison of price of the substitute goods consumed. "Technologies that do not increase area yields but make more efficient use of time or cash, are often equally acceptable and particularly attractive to small family farm units" (Moock, 1986, p.87). But no

technology is good for the subsistence farmer if he does not or cannot adopt it. According to Rees (1958) during his survey study of the plateau Tonga improved farmers, he found out that the principal means used to encourage the adoption of improved farming methods were the introduction of an acreage bonus scheme for farmers who reached certain prescribed standards of arable husbandry.

2.3 Farming systems in Zambia

Shula (1983, p.3) says, "the question of technology for production is closely linked to farming systems which in turn uphold existing socio-economic characteristics of rural situations that affect production decisions". Mook (1986) defines farming system as the totality of the production and consumption habits, crops, and cropping culture and husbandry. The day to day decision to effect these production and consumption activities by farm households are patent to the continuity and flexibility of a localised farming system.

Thus, in Zambia, there are about as many localised farming systems as there are different ethnic groupings which are further differentiated on ecological or/and agronomic conditions. With these environmental factors go the adaptations of farming systems.

All farming systems are open to adaptive change. Changes have been differentially effected in these localised

farming systems through for instance, factors of production or simply technological adaption and through changed habits of consumption or dietary structure, such as a switch from millet predominance to some share of maize meal "since change is often marked by a need for increased productivity to sustain the increasing population (local or national) or in adjustment to meet a widening and fixating scope for basic needs, rural agricultural development is an inevitable must" (Shula, 1983, p.3). Hence, subsistence agriculture in Zambia is mainly sustained by localised farming systems, and these systems strongly influence the rate of adaptive change for increased productivity of village farm units. Similarly, in Kanchomba there is a localised system which farmers follow. Farmers practice permanent cultivation where they grow a variety of crops using family labour and they also keep domestic animals. They also follow a simple type of crop rotation where different types of crops are grown on the same piece of land in different seasons or in successive interval of years. Land is left in fallow for a required period only when it can no longer produce the desired output (yields).

2.4 Diffusion of innovations

In Zambia, a number of subsistence or small-scale scale farmers have adopted farming technologies in various ways, through the spread of innovations. The new technology can

soread from one region to another through either expansion or relocation diffusion. Haggett (1983) says, when technologies spread by expansion, the methods of farming techniques being diffused remain, and often intensify in the originating region. For instance, the diffusion of an improved crop, such as a "new strain of hybrid maize", from one agricultural region to others. Similarly, technologies can also spread by relocation diffusion, where the things being diffused leave the areas where they originated as they move to new areas. The people together with their technology move or change their location to an ecologically different environment.

In most cases, the people who are on the upper level of the social hierarchy will adopt the new innovations and technology first and later, it will trickle down to the lower levels. Therefore, there can be little doubt that the adoption of a new idea or practice within a given society is a complex process. The path to full adoption is very often characterised by a process of trial and error, moving forwards and backwards, until one is in such a position as to make a final decision.

Mwila (1986) observed that there are certain (public) institutions that generate and introduce innovations and these innovations consist of characteristics. Apart from these institutions are members of a social system or farming community who also possess distinct characteristics. Some of

these characteristics of innovations include:

- (i) Relative Advantage: This characteristic is viewed as the degree to which an innovation is perceived to be better than the practice it replaces. This perception of this characteristic is often from an economic, social or cultural view point. For instance, the majority of economists consider profitability to be the key criterion for innovation adoption.
- (ii) Compatibility: This refers to the similarity of an innovation to an existing idea or practice which it may replace. Therefore, an innovation is less likely to be adopted if it is not compatible with an existing idea or practice, in terms of cultural values, beliefs and farmers' needs.
- (iii) Complexity: This is a situation where, the more complex an innovation is in terms of its operation, the more likely it is that it will spread at a slow rate, if at all.
- (iv) Observability: This is the extent to which the results of adoption are readily demonstrable to the adopter and other members of the farming community. For instance, some practices are readily, observable where as many others are more difficult to monitor and evaluate.
- (v) Risk and uncertainty: This is where, for instance a new (cash) crop threatens to displace basic food crops. Unless units of adoption (farmers) are drawn to believe

that the chances of making a loss are minimal, they may not accept the innovation no matter how appealing it might appear.

There are however, other characteristics of innovations that have not been outlined here but these have just been chosen to shade light on the characteristics of innovation said above, but does not mean that they are the most important ones. Each of the innovation characteristics referred to is important in its own right. Therefore the adoption or non-adoption (rejection) of the innovation(s) very much depends on these sets of characteristics.

2.5 Adopting of improved farming techniques

The bulk of the land in Zambia still lies within the traditional farming areas which, inspite of the changing circumstances, are primarily subject to customary land practices of the major resident ethnic groups. However, the exposure to modern or European type of farming, (particularly along the line of rail), may also have influenced the development of certain traditional farming systems in recent years.

In the Southern Province of Zambia, there were a number of technological changes in peasant agriculture in the 1930s and 1940s. First, there was increased innovation in the sphere of implements of production, particularly the increased adoption of the ox-drawn plough. Chinpungu (1987,

that the chances of making a loss are minimal, they may not accept the innovation no matter how appealing it might appear.

There are however, other characteristics of innovations that have not been outlined here but these have just been chosen to shade light on the characteristics of innovation said above, but does not mean that they are the most important ones. Each of the innovation characteristics referred to is important in its own right. Therefore the adoption or non-adoption (rejection) of the innovation(s) very much depends on these sets of characteristics.

2.5 Adopting of improved farming techniques

The bulk of the land in Zambia still lies within the traditional farming areas which, inspite of the changing circumstances, are primarily subject to customary land practices of the major resident ethnic groups. However, the exposure to modern or European type of farming, (particularly along the line of rail), may also have influenced the development of certain traditional farming systems in recent years.

In the Southern Province of Zambia, there were a number of technological changes in peasant agriculture in the 1930s and 1940s. First, there was increased innovation in the sphere of implements of production, particularly the increased adoption of the ox-drawn plough. Chinpungu (1987,

that the chances of making a loss are minimal, they may not accept the innovation no matter how appealing it might appear.

There are however, other characteristics of innovations that have not been outlined here but these have just been chosen to shade light on the characteristics of innovation said above, but does not mean that they are the most important ones. Each of the innovation characteristics referred to is important in its own right. Therefore the adoption or non-adoption (rejection) of the innovation(s) very much depends on these sets of characteristics.

2.5 Adopting of improved farming techniques

The bulk of the land in Zambia still lies within the traditional farming areas which, inspite of the changing circumstances, are primarily subject to customary land practices of the major resident ethnic groups. However, the exposure to modern or European type of farming, (particularly along the line of rail), may also have influenced the development of certain traditional farming systems in recent years.

In the Southern Province of Zambia, there were a number of technological changes in peasant agriculture in the 1930s and 1940s. First, there was increased innovation in the sphere of implements of production, particularly the increased adoption of the ox-drawn plough. Chinpungu (1987,

p.56) says, "by 1934 the introduction of the plough on the plateau... had changed the native traditional method of agriculture ... to that of stumping the land and ploughing with oxen". In Monze, peasants were ordering two and three furrow ploughs and inquired for young trollies. There were however, other peasants on the plateau who could not purchase their own ploughs and Chipungu's (1987) survey indicates that some people on the plateau used the ploughs of relatives without any form of payment especially in cases of shared oxen belonging to the extended family. Some peasants particularly the more influential headmen and elders residing near mission stations, often used mission ploughs and oxen. Hence the plough became important in cultivation before planting but the hoe was still the predominant tool in sowing and weeding. And the axe was equally important in the process of stumping, cutting and general clearing of the fields.

The other agricultural significant change was in the type of crops peasants grew. Chipungu (1987, p.57) says, "There was a generalised shift from production of indigenous crops (e.g. sorghum, millet) to relatively new and higher yield crops". Most dramatic was the shift from growing sorghum to maize monoculture. According to Chipungu (1987, p.58), during his study survey on the plateau Tonga," one respondent recalls the development of maize mono-culture in Chief Sianjalika's area (Mazabuka district) in the 1930s, as

like a disease spreading in the community; and nobody paid attention to Maila (sorghum) any more,". Similarly, for the peasants in Chief Macha's area, the 1930s were also the time they bade farewell to Maila. Hence, maize quickly became the staple food crop as well as the most important cash crop.

Resides changes in tools and crops, agricultural change in the Southern Province of Zambia also involved innovation in land-use techniques. Traditional agriculture in the Southern Province, like in any other parts of the country and Africa, was based on shifting cultivation or bush-following techniques. Allan (1965, p.6) states that, these techniques involves" a periodic move of the exploiting group from one area of land to another as a matter of agricultural necessity for un aided African cultivators". Further, Allan (1965) argues that voluntary shifting cultivation were found in areas where land was so abundant, in relation to the population and its requirement, that the period of natural soil regeneration had no practical significance and there was no need for man to think of returning to the land he had cultivated within the foreseeable future. Kajoba (1988) also argues that although the Tonga people had been shifting/subsistence cultivators, they experienced a radical change due to the changes in the mode of production which had been introduced through the general imposition of the colonial/capitalist modern of production. According to Chipungu (1987, p.59), "Changes in utilization of the land

like a disease spreading in the community; and nobody paid attention to Maila (sorghum) any more,". Similarly, for the peasants in Chief Macha's area, the 1930s were also the time they bade farewell to Maila. Hence, maize quickly became the staple food crop as well as the most important cash crop.

Besides changes in tools and crops, agricultural change in the Southern Province of Zambia also involved innovation in land-use techniques. Traditional agriculture in the Southern Province, like in any other parts of the country and Africa, was based on shifting cultivation or bush-following techniques. Allan (1965, p.6) states that, these techniques involves" a periodic move of the exploiting group from one area of land to another as a matter of agricultural necessity for un aided African cultivators". Further, Allan (1965) argues that voluntary shifting cultivation were found in areas where land was so abundant, in relation to the population and its requirement, that the period of natural soil regeneration had no practical significance and there was no need for man to think of returning to the land he had cultivated within the foreseeable future. Kajoba (1988) also argues that although the Tonga people had been shifting/subsistence cultivators, they experienced a radical change due to the changes in the mode of production which had been introduced through the general imposition of the colonial/capitalist modern of production. According to Chipungu (1987, p.59), "Changes in utilization of the land

took place in the 1930s in the wake of the maize monoculture and land alienation". This new land-use system, particularly on the maize-Tonga plateau, involved stumping trees rather than only cutting branches. This new land-use system resulted in permanent settlements particularly in the high density areas closer to the line of rail, European settler farms and mission stations. Kajoba (1988, p.115), states that, "people were making permanent or immovable improvements on land such as fences, bore holes, and brick houses". Further, Kajoba (1988) argues that many hundreds of miles of farmland were fenced with barbed wire especially in Mazabuka district. Therefore, Chipungu (1987) concluded that the Tonga were taking an increasing interest in improved methods of agriculture.

Similarly, in the Eastern Province of Zambia the increased productivity in agriculture in the 1930s and 1940s were largely dependant upon the adoption of improved farming techniques; the innovations being simple and inexpensive. According to Kay (1965, p.38), "during and after the second world war, the department of agriculture introduced several simple but effective improvements in land husbandry in Eastern Province". These changes improved the yields of food crops and increased crop surpluses, but production remained severely limited by the predominance of hand methods in all farm operations. However, after 1945, permits were used for the purchase of a plough and these

permits were only issued to those who had acquainted themselves with the correct use of the implement and had agreed to plough only along the contours.

A number of schemes were introduced in Eastern Province, to improve agriculture. Such schemes includes the Eastern Province African Farming Improvement Scheme (EPAFIS) with the objective of encouraging improved farming and it did so largely by paying bonuses for good farming and by subsidising the purchase of basic farm inputs and implements such as improved seeds, chemical fertilisers, ploughs etc. Apart from EPAFIS, a Village Improvement Scheme (VIS) was introduced and adopted in 1956 in Petauke District. Under this scheme, the whole villages were exhorted to improve their cultivation techniques. Those who did so to the satisfaction of the department of Agriculture, received bonuses in the form of free fertilisers and improved seed.

Kay (1965), says, by 1960 there were 292 villages following a simple rotation and practising improved agronomic techniques in response to this scheme. Such evidence indicates that a revolution had begun in African farming in the eastern province just as in the southern province. New techniques were being increased. Kay (1965, p.51), states that, "without doubt the peasant farming scheme had played an important pioneer roll in these developments". There are however, other schemes that were introduced in Eastern Province to improve agricultural

system through the department of agriculture that have not been mentioned in this research report.

Immediately after independence, the state expanded extension services through the establishment of agricultural camps and farmer's training centres, to provide national coverage, although this still remains rather incomplete in some of the more sparsely settled parts of the country. Technology transfer to the small-scale producers was seen as a major method by which their production could be increased and consequently further state investments were made in the provision of mechanisation units to provide tractor ploughing services in each district.

Wood (1990) argues that these subsidised support services were complementary to the improved provision of inputs through the expanded crop collection and input supply network, and to the increased subsidies on the price of chemical fertilisers. Varieties of fertilisers could now be purchased easily thereby limiting the role of the once highly recommended rotation and green (dung) manure strategies of replenishing soil fertility, hybrid seeds of maize such as S.R.52, sorghum and other crops were made available to farmers to maximise yields. According to Milimo (1990, p 42), "Zambia has seen an increase in maize production... caused by the heavily subsidised fertilisers, which go towards maize production and by the good maize prices." Because of fertiliser subsidies for over a decade,

many subsistence peasant farmers were able to purchase some pockets of the commodity, which facilitated the move from tradition methods to modern methods of maize production (Kajoba, 1994).

Extension, credit, pricing and marketing policies have all been used to encourage agricultural change since independence. Kajoba (1994) also observed, with respect to North-western Zambia that this process of change is largely a result of the diffusion and adoption of improved agricultural methods connected to government and donor promotion and extension of the cultivation of hybrid maize, as a cash crop. Therefore, it is evident that a lot of plateau Tongas were following fairly closely the improved methods of agriculture even before independence as seen above and this process has continued into the 1990s.

CHAPTER THREE

3.0 LOCATION AND DESCRIPTION OF THE STUDY AREA

3.1 Location and infrastructure

The study area lies within Choma district in Southern Province of Zambia. It lies between latitudes 16° 30' and 16° 35' south and longitudes 27° 26' and 27° 32' East (figure 1). It is about 14km away from the Great North Road, east of Pemba town. The study area is about 25km² and is made accessible by the network of gravel roads (see figure 2).

The study area has a number of institutions such as the Kanchomba farm institute, Hamaundu Local Court, Kanchomba Basic School, private shops, welfare hall and rural health centre.

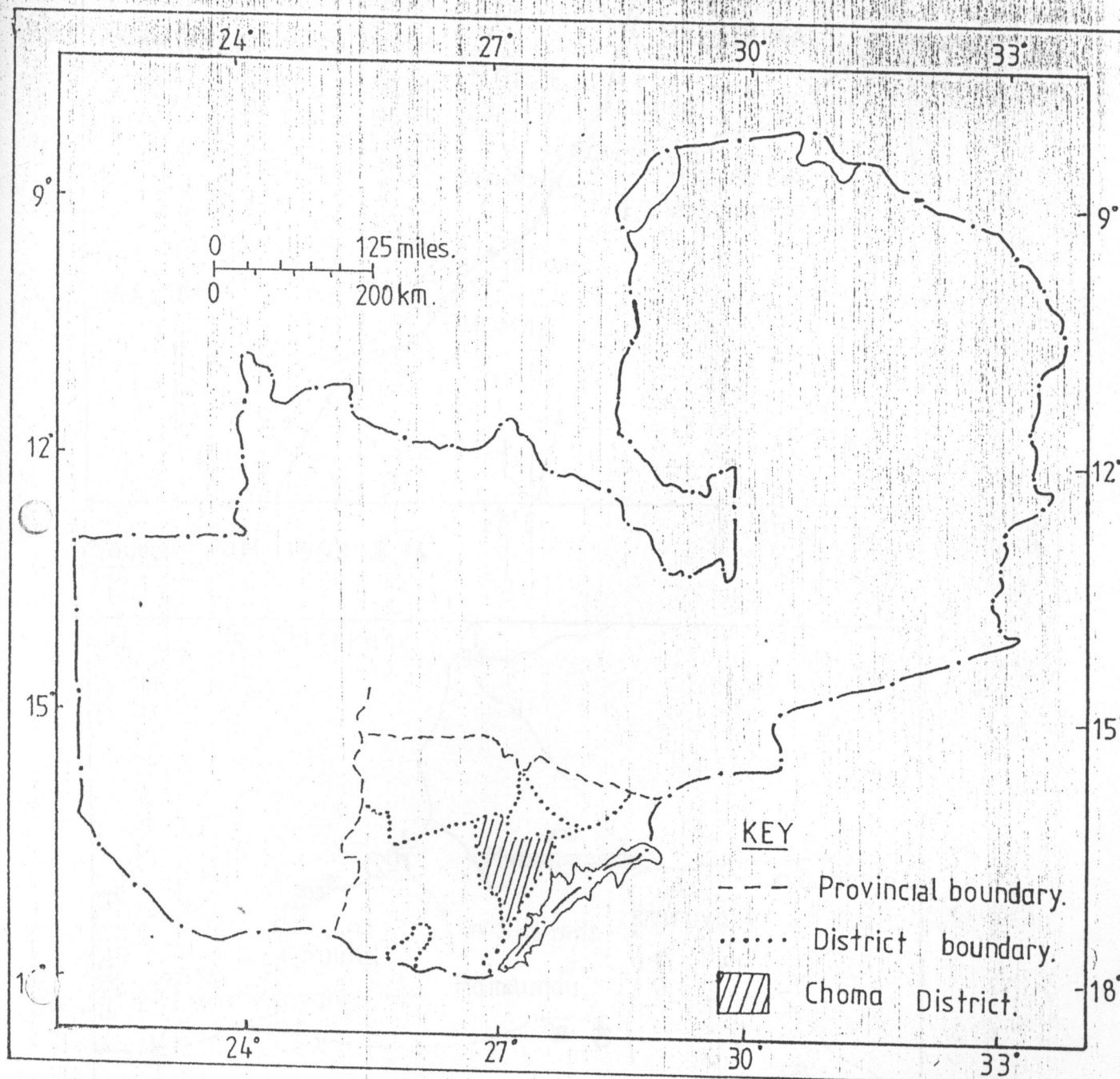
3.2 Physical features

3.2.1 Climate

According to Archer (1971), the Southern Province lies in the tropics, but the climate is typically sub-tropical because altitude moderates it. The mean annual temperature for the study area varies from 18°C to 21°C. The area is however, characterised by the three main seasons:

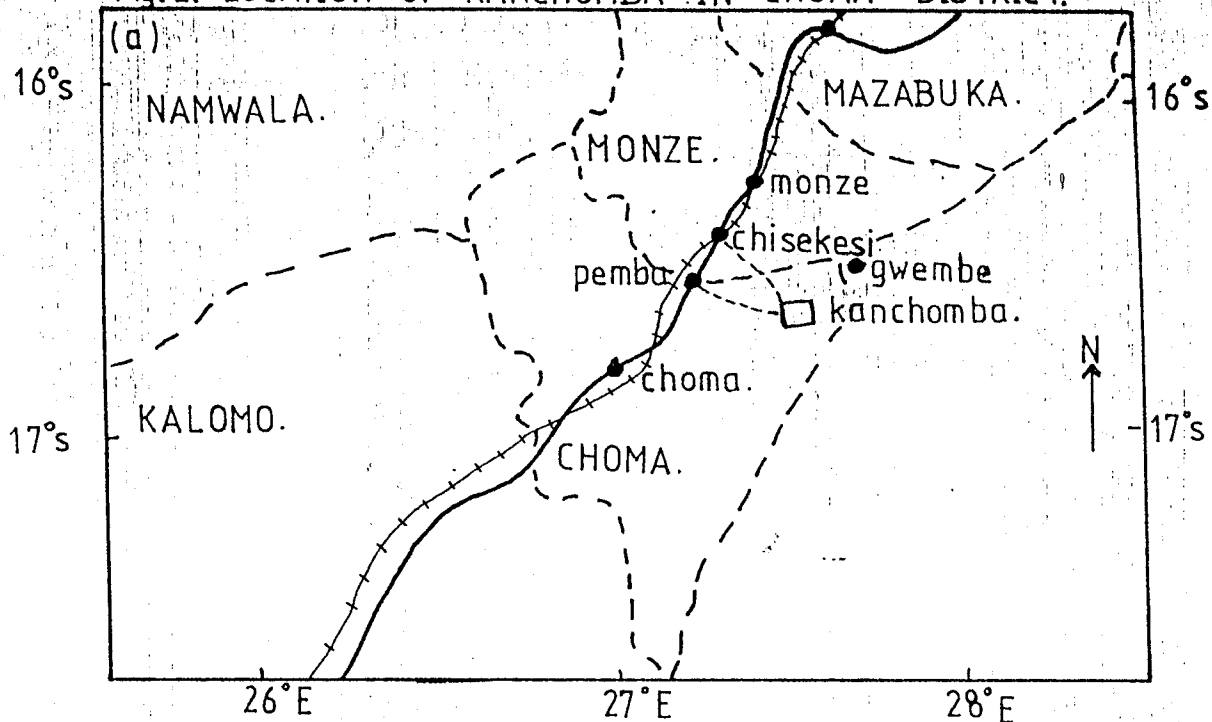
- (i) warm-wet season: extends from October/November to March or April
- (ii) Cool dry season: lasts from May to August.
- (iii) Dry-hot season which begins in September and lasts till

Fig.1. LOCATION OF CHOMA DISTRICT IN SOUTHERN PROVINCE.

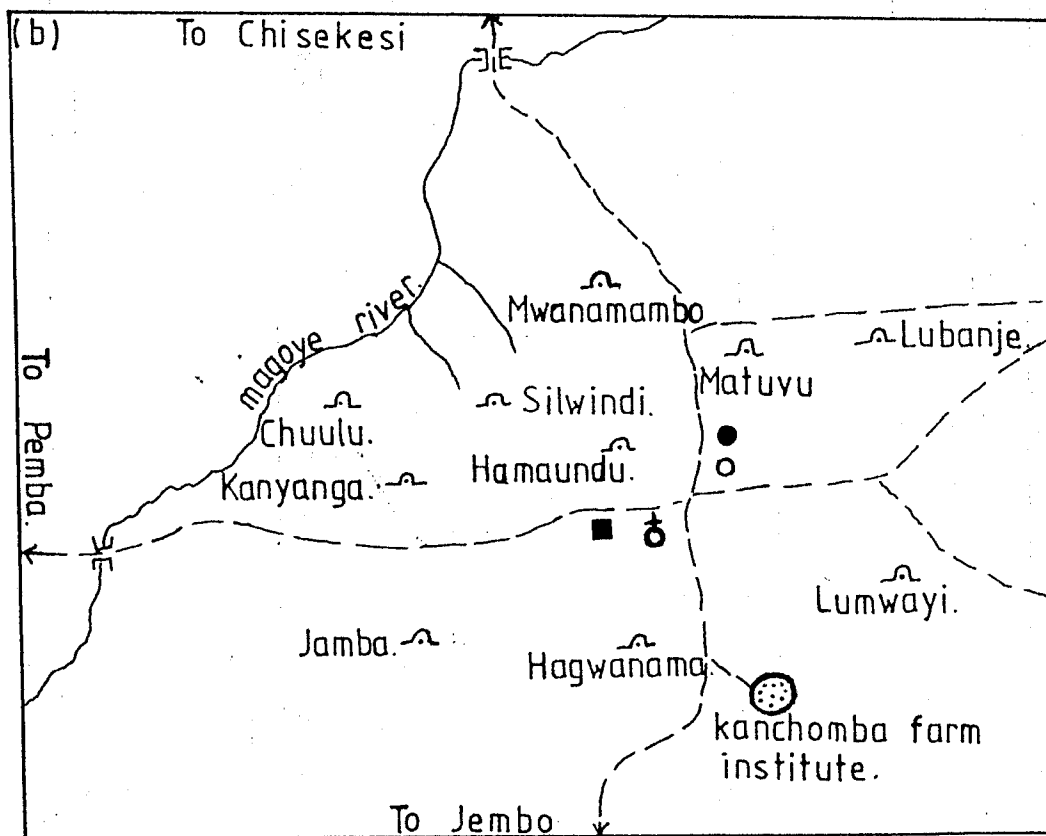


SOURCE: Siddle (1971). P. 51.

Fig.2. LOCATION OF KANCHOMBA IN CHOMA DISTRICT.



Source: PAM, 1993 P.34.

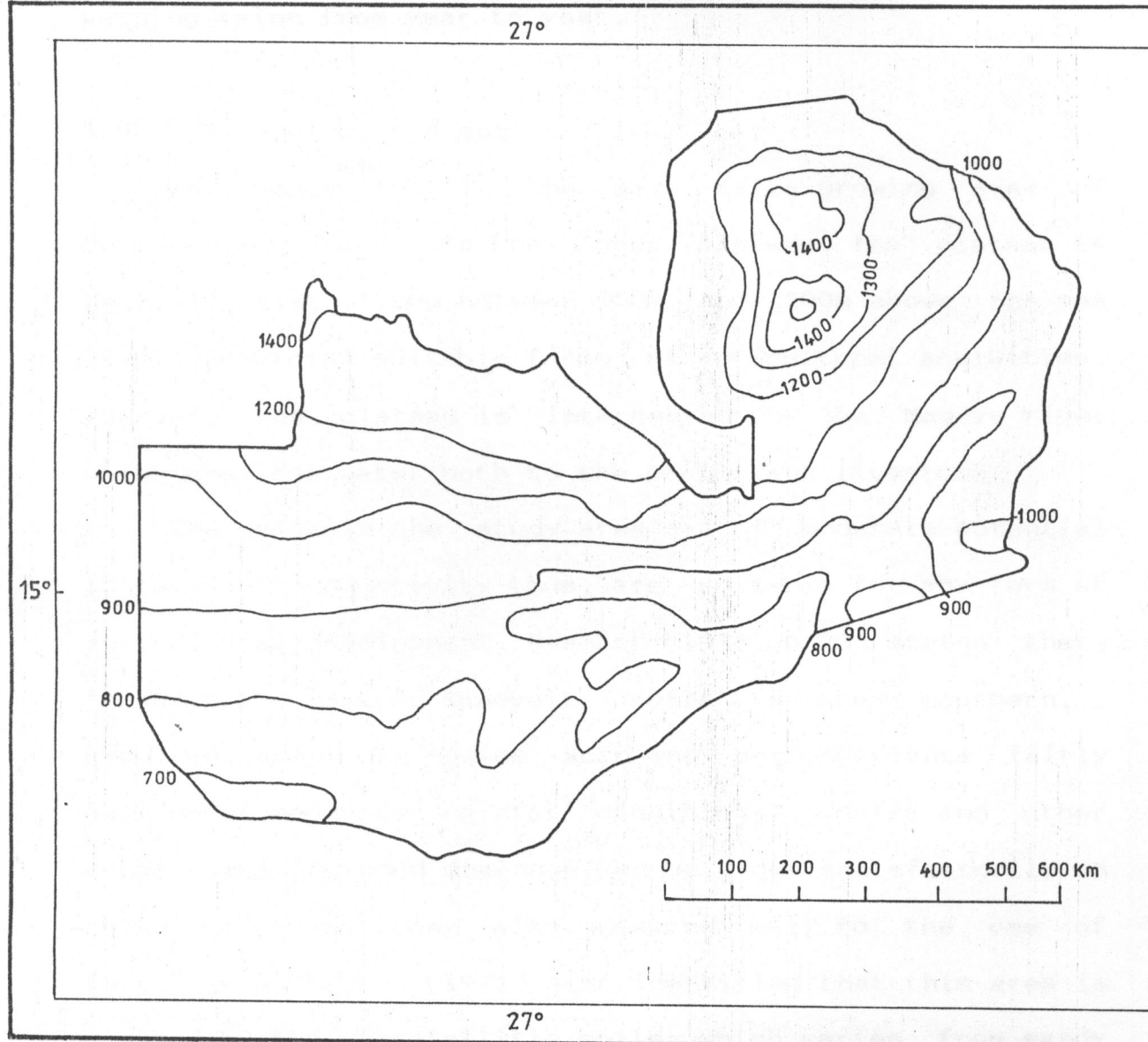


Source: 1:50,000, Map sheet: 1627 C2, 1973.

KEY.

- | | |
|------------------------------|----------------------------|
| ■ — — — School. | ———— Tarred road. |
| ● — — — Rural Health Centre. | ——— Motorable track. |
| ○ — — — Local Court. | + + + + Railway line. |
| ⚭ — — — Mission Station. | - - - - District boundary. |
| ⌒ — — — Village. | ~~~~~ River. |

Fig. 3 : MEAN ANNUAL RAINFALL IN ZAMBIA (Millimetres)



Source: Hutchinson, P. 1974 "The climate of zambia" ZGA No 7.

the end of October.

The mean annual rainfall varies between 600mm and 800mm (see fig. III). However, the rains period is affected by the varying rains from year to year.

3.2.2 Geology and soil

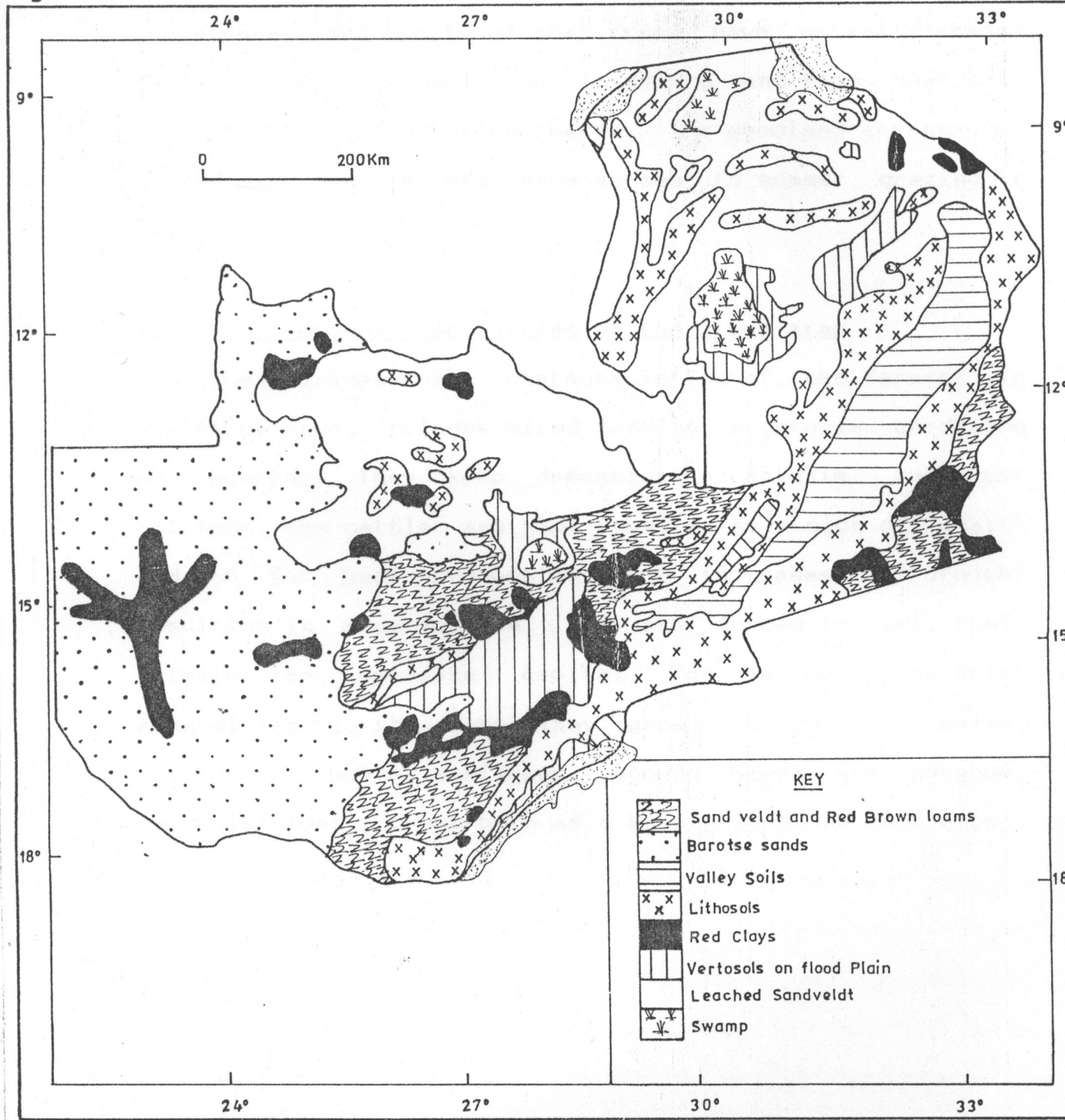
The study^{area} lies in the main maize growing area of Southern Province, on the Tonga plateau. The plateau is generally flat lying between 900m and 1200m above the sea level, providing suitable forms of agricultural activities. However, the plateau is intercepted by the Magoye river which provides water both to the people and livestock.

The soils in the study area are of moderate potential in terms of productivity thus, are suitable for any form of agricultural development. Brammer (1976, p.23) states that, "moderately leached Sandvelt soils in the southern... province, are only medium acid and hold nutrients fairly well under moderate rainfall conditions". Maize and other crops requiring good drainage can be grown satisfactorily on these soils as they also respond well to the use of fertilisers. Mackel (1971) also identified that this area is covered by the fersiallitic soils, which varies from sandy loams to loamy. For further details see figure 4.

3.2.3 Vegetation

The main vegetation type in the study area is woodland

Fig. 4 : SOILS OF ZAMBIA



Source: Brammer (1976).

savanna. This type of vegetation is characterised by *Brachystegia-isoberlinia* species, and is accompanied by open grasslands, and most of the trees have umbrella shaped canopy. They are deciduous in nature and some have long roots to reach underground water. The woodland savanna is grazed with cattle, who have access to summer grazing in dambo.

3.3 Socio-economic activities of the study area

The socio-economic characteristics of the farmers in the study area includes mixed farming, vegetable gardening and hunting. They keep domesticated animals and rear chickens. The cattle are kept usually as a sign of wealth and not for beef production. But in cases of drought resulting in crop failure, they are forced to sell their animals to generate capital for various essential commodities in the home. They grow crops such as maize, groundnuts, beans, sunflower, ground beans, and sorghum. Maize is usually grown both as a staple food and cash crop.

CHAPTER FOUR

4.0 METHODOLOGY

4.1 Data Collection

This chapter gives information on how data was obtained from small scale farmers of Kanchomba, east of Pemba in Southern Province.

Two methods were used to collect data for the study and these are as follows:

- (i) Library Research: This method involved the collection of secondary data and this was obtained from various sources such as the University of Zambia Library; Ministry of Agriculture, food and fisheries; and Mount Makulu library. Some of the data collected include:
 - (a) the characteristics of subsistence/small-scale farmers;
 - (b) the choice of adoption of innovations.
 - (c) adoption process etc. This data helped in coming up with the literature review.
- (ii) Field Research: This involves the collection of primary data and was done by conducting interviews to get responses from small-scale farmers and agricultural extension officer. Primary data was also obtained using field observation which involved monitoring ploughing techniques, quality of crops and use of hybrid seeds and fertiliser application.

4.2 Sampling procedure

The random sampling method was used in the collection of data from the small scale farmers in order to give each household an equal opportunity to be included in the sample. Each household was given a number and only forty (40) households randomly selected were interviewed due to limited time, as the data collection was done in four weeks only.

4.3 Characteristics of sample

The sample consists of forty (40) respondents. These were randomly selected by assigning each household a number from 10 villages namely: Mwananambo, Siagwanama, Silwindi, Matovu, Hamaundu, Lubanje, Lumwayi, Kanyanga, Jamba and Chuulu, and this was made possible from using a farmer's register obtained from Agricultural extension officer.

The sample consists of both females and males, despite that females interviewed were fewer than males. This is because the interviews were only conducted with the head of the household and this proved that most of the heads of the household interviewed were males. Hence, only four (4) females were interviewed.

4.4 Problems encountered

There were a number of problems experienced during the collection of data. These include:

- (i) Transport problem: the researcher had to foot from one randomly selected household to the other despite that sometimes a bicycle was used.
- (ii) Some respondents could not express freely and clearly their views, wishes and ideas in the presence of family members and friends.
- (iii) Data collection was time consuming as respondents were interviewed person to person. In some cases respondents were found to be engaged in ploughing as data was collected during the ploughing season and hence, could not pay much particular attention to the interviews.

On the other hand, the researcher found it easier when interviewing respondents, as he used the language the local people understand. The questions were translated into Tonga which the farmers understand.

CHAPTER FIVE

5.0 RESEARCH FINDINGS AND DATA ANALYSIS

5.1 Socio-economic characteristics of farmers.

5.1.1 Gender

The subsistence farmers in Kanchomba comprises of both females and males. However, the research findings comprises of more male farmers (90%) than female farmers (10%) in that the head of the household was interviewed only. This shows that most of the heads of the households were male farmers.

5.1.2 Age of farmers

The majority of the farmers in the survey area ranges between 35-60 years old, and all of them were born within the area and have been in the area since then.

5.1.3 Level of education

Like in any other part of Zambia, the farmers in the study area underwent some kind of formal education. There is however, 25% of the farmers that did not do formal education. However, 75% did formal education, either primary or junior secondary school education. Table 1 shows the kinds of education farmers received.

Table 1. Farmer's Level of Education

Level of education	Actual no of people	Percentage
Primary	18	45
Junior Secondary	7	17.5
Senior Secondary	5	12.5
College/University	-	-
Non	10	25
Total	40	100

5.1.4 Marital Status

Most of the farmers in the study area are married to more than one wife and all female respondents interviewed were widows and hence not married. But all the male respondents were married.

5.1.5 Household size of respondents

The farmer's household size in the survey area are generally big. This is a result of the fact that, most of the farmers are polygamists, and keep a lot of dependants. The household sizes are shown in Table 2. below. The larger the household the more the farmer is required to produce enough food to feed the family. Apart from this, the farmer also will be required to provide enough basic needs such as clothes, shelter, health-care, good nutrition foods, education etc. However, the farmer with large household size is at an advantage in terms of farm labour requirement.

Table 2. Farmer's household size

Household size	Actual No	Percentage
Below 10	7	17.5
10-14	8	20
15-19	10	25
20-24	7	17.5
25-29	6	15
30+	2	5
Total	40	100

5.2 Farm Inputs

The farm inputs includes fertilisers, seeds, machinery, land and ox-drawn implements that farmers requires during cultivation.

In the study area, the farm inputs are made available to the farmers by the Zambia co-operative federation-finance services (ZCF/FS). Before ZCF/FS started supplying the inputs to the farmers, inputs were supplied by National Agricultural Marketing Board (NAMBOARD), which was established in 1969. NAMBOARD was responsible for providing a wide variety of marketing functions. It had a monopoly on the distribution and sale of fertilisers, and it distributed and sold other agricultural supplies, including seeds. The farmers in the area benefited from the services of the NAMBOARD too.

When NAMBOARD collapsed, the Southern Province Co-operative Marketing Union (SPCMU) started supplying services

to the farmers in the area. This was made possible by the creation of a Branch of Choma district cooperative marketing union (CDCMU) in the area in 1984. Most of the farmers became members to the established Branch Union.

The CDCMU supplied inputs such as chemical fertilisers, certified seeds, ox-drawn ploughs, spare parts for the farm implements, hoes and cultivators. These inputs were purchased by farmers either through credit or cash. Loans were made available to all farmers whether a member or a non member but priority was given to the members in order to encourage other farmers to join the union. Apart from this the union also organised agricultural meetings for both its members and non-members, to give hints on things such as methods of growing crops, better use of implements and marketing crops procedures.

Furthermore, the government subsidised both maize production and consumption through inputs subsidy and maize marketing. The subsidies covered costs for inputs and fixation of fertilisers, seed and maize prices. This motivated subsistence farmers in the area to produce more both for their household consumption and for sale.

However, the removal of maize subsidies in 1989 resulted in high prices for both agricultural inputs and maize production. The adoption of the policy of free market economy by the movement for multi-party democracy (MMD) in 1991 worsened the whole situation. The government no longer

directly supply inputs but instead decontrolled the prices of inputs, removed subsidies and made provision of inputs available to the private sector. The farmers in the study area expressed that this actually made their cultivation very difficult. Further, farmers said, despite that at times they used to receive the inputs late, they were at least assured of something. Unlike nowadays where they don't even receive the inputs at times. Even when the inputs are made available farmers are unable to purchase them due to lack of funds. In some cases the wrong inputs are delivered and farmers are forced to buy as there is no other option. For instance, the farmers in the area are used to apply compound R as the basal dressing fertiliser for maize, but last planting season, applied compound D as it was the only one available, which is not good for maize crops. Similarly, there was no top dressing fertiliser (urea) delivered to the area.

The farmers who cannot afford to buy the inputs from ZCF/Es and Non-governmental organisations (NGOs) expressed worries. About 75% of the farmers used to apply chemical fertilisers such as compound R, compound D, Ammonium Nitrate and Urea before the removal of subsidies and adoption of the policy of market liberalisation. However, at present farmers switched to kraal manure application and sometimes apply nothing. Similarly, most of the farmers use non-official hybrid seeds as compared to the period of input subsidy when

62-52 used official hybrid seeds. The farmers have no option but to do what they think will earn them a living.

5.2.1 Farm Implements

During the colonial regime, particularly in the 1930s, there was increased innovation in the sphere of implements of production. African farmers had started to acquire ox-drawn ploughs.

In the first and second republics, the number of farmers using ploughs, cultivators and oxen increased tremendously. The farmers purchased these implements either from the neighbouring whites, mission station, farm centres or borrowed from friends and relatives. The farmers in the study area underwent a similar process of implement acquisition especially that the area is near to the line of rail where most of the white farmers had settled and the presence of the farm institute in the area necessitated the process.

Farmers use ox-drawn ploughs, cultivators, oxen, cows, ox-harrows and hoes. Usually the cultivators are used for weeding and in the absence of these, hoes are put into use. Similarly those without enough oxen use cows. Table 3a shows the types of implements the farmers used before independence and Table 3b. shows the implements farmers use at present.

Table 3(a) Farm Implements used by farmers in the Pre-independence period

Tools	Actual No of farmers	Percentage
Tractor	-	-
Oxen	10	25
Cow	-	-
Plough	5	12.5
Cultivator	-	-
Harrow	3	7.5
Hoe	24	60
Axe	18	45

(b) Farm Implements presently used by farmers

Tools	Actual No of farmers	Percentage
Tractor	-	-
Oxen	34	86
Cow	4	9
Plough	38	94
Cultivator	30	74
Harrow	28	69
Hoe	40	100
Axe	40	100

When we compare Table 3a and 3b, it shows that there has been a tremendous increase in the adoption of implements by farmers after independence. There are 94% of farmers now that use ox-ploughs as compared to 12.5% during the colonial periods; 86% use oxen as compared to 25% before independence; 74% use cultivators while before independence there was none and both the hoe and axe are 100% used unlike in the colonial periods where only 60% and 45% were used

respectively. This all implies that there is diffusion of innovation in the study area as regards to implement usage.

The majority of the farmers have been using these implements for about 30 years now and complained of lack of spare parts especially for ox-drawn ploughs and cultivators. Even when the spare parts are available, farmers are unable to purchase them due to inadequate funds available. These implements were acquired by farmers through loans and the absence of loans and the coming of the liberalised market economy have made it difficult for the farmers to get new implements and have the old ones repaired.

However, the farmers showed that they have all the skills and knowledge required in handling the implements for quite a long time. This was also observed during the field observation period as the research was carried during the planting and growing season. The most interesting thing about the use of these implements, is that young ones know how to handle and use them effectively.

5.3 Labour

Labour is one of the most important factors of production. Most of the small-scale farmer's labour depends on household size. The smaller the size of the household the more labour is required in order to meet the demands of production. The bigger household do not suffer much in terms of labour as compared to smaller ones.

In cases where the household size is smaller, hired

labour or help from friends and relatives is required. Table 4 shows the types of labour in the study area among the farmers. About 60% of farmers depend on family labour, 15% of farmers depend on extended labour and only 2% of farmers hire labour.

Table 4. Source of Labour on the farm

Labour farmers currently use	Actual No of farmers	Percentage
Family	24	60
Extended	6	15
Hired	1	2
Family & Extended	5	13
Family & hired	2	6
Extended & hired	2	6
Total	40	101

5.4 Land-use

The land tenure system in the study area is just the same as in any other part of the Tonga land. In all the villages included in the study, the land is under traditional tenure. The authority to allocate land is vested in the chief but however, certain powers are delegated to the headman to allocate land to his people within that village.

Land in the study area is cropped continuously to maize so long as it will yield any sort of crop and is rested only when it will no longer do so. In addition some land is

worked more or less accidentally for a short period of time (1-2 years), either because of the absence or illness of the holder or because he was unable to obtain a plough in time to enable him to plough the whole of his acreage. Further some farmers expressed that, some fields are abandoned when the soil is no longer fertile and this is done in order to retain or restore fertility. With the use of the plough and the growing pressure on the land, the system of regular cropping and fallowing has practically disappeared throughout the areas included in our survey. But the proportion of crop to fallow varies from one village to another. The Table below shows land presently owned by the farmers in the villages surveyed.

Table 5 Land presently owned by the farmers

Land farmer currently owns	Actual No of farmers	Percentage
No land	3	7.5
More than 5ha	20	50
Between 1-4ha	10	25
1/4ha (1/4ha)	7	17.5
Total	40	100

Peasants till the land using ox-traction and grow a variety of crops. Further, the land is rotated by growing a different crop on the same piece of land after 2-5 years.

5.5 Crop Production

Crop production in Zambia has been characterised by hybrid maize. This is a result of the wide spread recognition, by farmers, of the crop as both a staple food and a cash crop. Similarly, in the study area, this perception is not an exception, however, there is crop diversity in the area, in that the people grow groundnuts, beans, groundbeans, sunflower, sorghum, apart from the famous maize.

Since the Kaunda regime, there has been a tremendous introduction of varieties of hybrid maize to be grown especially by small scale farmers. Both in the first and second republics, SR52 was widely grown but towards the end of the second republic a number of varieties of hybrid maize were introduced such as MM400, MM502, MM603 and MM604. These hybrid seeds of maize, are widely grown in the study area too, and especially MM603 and MM604, as they seem to respond well to the conditions of the area and farmers have a liking towards these two in that their growing period tend to be shorter, ripe early and doesn't require a lot of rainfall. This also has been initiated by the agricultural extension officer in the area, who renders advise to farmers on growing period, spacing and varieties of seeds to use. The Tables below show the varieties of hybrid seeds farmers used before independence and after independence respectively.

Table 4(a) Hybrid seeds farmers used in the pre-independence period.

Varieties	No of farmers	Percentage
SR52	15	37.5
Non-hybrid	35	87.5

This Table shows that very few farmers used hybrid seeds before independence, as only 37.5% of farmers used SR52 and a lot of them were using non-hybrid seeds (87.5%).

Table 4(b) Hybrid seeds farmers presently use

Varieties	No of farmers	Percentage
MM400	15	37.5
MM502	20	50
MM603	30	75
MM604	35	87.5
Non hybrid	15	37.5

Table 4(b) shows that on the average 62.5% of the farmers use hybrid seeds and only 37.5% use non-hybrid seeds as compared to 87.5% in the pre-independence period. This shows that most of the farmers have adopted the hybrid seeds. The 37.5% of the farmers cannot afford to purchase these varieties especially with the liberalised economy. As a result they have embarked on the use of the non-hybrid seeds to meet their needs. Sometimes they borrow from neighbouring friends and relatives. Therefore, farmers have a tendency of going back to the tradition way of cultivation where 87.5%

of the farmers used the non-hybrid seeds and only 37.5% used hybrid seeds.

Maize is given the first priority in the area as a result of being considered as a cash and staple food. About 100% grow maize as a staple food while 28% grow it as well as a cash crop. This shows that farmers in the area mainly grow maize for household consumption, and the surplus produce is sold to generate income.

The farmers also grow groundnuts apart from the famous maize. The common varieties includes Makuru red, Natal common, and Chalimbana. Groundnut growing is mostly done by women who usually use hoes both for planting, weeding and harvesting. Groundnuts are added to relish especially in vegetables, made into peanut butter and the surplus produce is sold locally.

Table 7 shows the common crops grown in the survey area and the number of farmers that grow specific crops.

Table 7. Common crops grown

English Name	Tonga Name	Actual No of farmers	%
Maize	Mapopwe	40	100
G/nuts	Indongwe	38	95
Sunflower	Malangazuba	32	80
Beans	Nyabo	24	60
G/beans	Nyemumbwila	28	70
Sorghum	Maila	5	12.5

The Table also shows a certain level of crop diversity in the area. It shows (or rather seems) that experience in crop cultivation have taught them not to rely on one type of crop.

The pattern of production have changed may be due to innovation and new cultivation techniques. Under the peasant farming mode of production, the entire household devoted most of its time and energy to food production, but the coming of the money economy has resulted in production not only for consumption but cash as well. This has led to men specialising in cash crops and women remaining food producers. This was observed during the survey in the study area too. Although women continue to work on food crop fields they are often expected to work on cash crop fields as well. Table 8 shows maize production in the villages interviewed.

Table 8. Maize production in Ten villages (90kg bags)

Growing season	Actual No of bags
1990/91	2,160
1991/92	200
1992/93	1,300
1993/94	355

Source: Survey Data.

Table 8 shows that there has been a tremendous decline in the production of maize in the villages surveyed. On the average a farmer in 1990/91 season produced 54 (90kg) bags of maize

The Table also shows a certain level of crop diversity in the area. It shows (or rather seems) that experience in crop cultivation have taught them not to rely on one type of crop.

The pattern of production have changed may be due to innovation and new cultivation techniques. Under the peasant farming mode of production, the entire household devoted most of its time and energy to food production, but the coming of the money economy has resulted in production not only for consumption but cash as well. This has led to men specialising in cash crops and women remaining food producers. This was observed during the survey in the study area too. Although women continue to work on food crop fields they are often expected to work on cash crop fields as well. Table 8 shows maize production in the villages interviewed.

Table 8. Maize production in Ten villages (90kg bags)

Growing season	Actual No of bags
1990/91	2,160
1991/92	200
1992/93	1,300
1993/94	355

Source: Survey Data.

Table 8 shows that there has been a tremendous decline in the production of maize in the villages surveyed. On the average a farmer in 1990/91 season produced 54 (90kg) bags of maize

and in 1993/94 season only 9 (90kg) bags of maize. This decline have been partly as a result of drought especially in 1991/92 season, and the MMD government has to depend on foreign Aid to feed the people in the country. Drought which is a result of little or no rainfall led to crop failure and hence affected the production of maize in the area.

The farmers gave their own reasons related to the decline in maize production. The majority of the farmers expressed that apart from drought, the inputs were delivered late, late rains, lack of inputs, lack of capital and in cases where the inputs were not brought to the area, the farmers have to cover long distances and purchased the inputs at the nearby town (ie. either at Pemba, Chisekesi or Monze) and usually at very high prices from private shops. Further, loans are no longer made available to the farmers since the collapse of CDCMU towards the end of 1992, which used to provide loans to farmers. These factors actually led to the adverse decline in crop production especially maize production, in the area.

However, despite this decline in crop production in terms of bags produced, farmers continued and still grow maize as it is considered to be the main staple food in the area. Hence farmers have no option but to grow it and only hope for the better yields. But there is need to introduce drought resistant crops in the area, such as millet, sorghum

and cassava

During the previous season, about 71.1% of the farmers had their yields on the average, 20% below average and only 3% above the average. These percentages indicates that the farmers in the area at least had enough food for consumption within the family. As the Table below shows that only 32.5% of the farmers sold their produce and 67.5% did not sell their produce rather only grow for home consumption.

Table 2. Sell of Produce

People who sold maize	People who did not sell maize	Total
13 32.5%	27 67.5%	40 100%

Farmers sold their produce to the ZCF-FS and locally and on the average obtained only K78,000. These farmers have been growing the same crops for a period of 35-40 years and seem to have gained experience, skills and knowledge in the area.

3.6. Centre of Innovations

Kauchomba agricultural camp, the centre of innovations is located to the south of the villages interviewed (see Fig. 2 b). However, all the villages interviewed has access to the centre but those nearer to the centre have more

access to it, and these are Bagwanama, Jamba and Lumwayi. This is because these villages can easily be reached by extension officers and can easily observe what is being done at the centre than those villages located in the periphery. The argument here is that innovations spread, from the centre to the periphery. However, farmers in Hamandu village are advantageous in that the area is a shopping centre and most of things found at the centre of innovations can be found here too.

5.7 Extension Service

These are services that are rendered to the farmers by the extension officers in extension camps or farmer training centres.

In the survey area, the extension officers, at Kachomba Agricultural camp, are supposed to visit the farmers every week according to their Extension Training and visiting individual farmers in 8 training zones area (T and V system). Each zone consists of the village, and all farmers, whether male or female are supposed to attend agricultural training sessions. The training sessions are done twice in a month.

The extension officer visits the farmers in the area to teach them new techniques, monitoring taught innovations, assess the quality of crops grown and techniques used, assess ox-drawn implement usage, farm record keeping and

soil erosion control measures.

Furthermore, they also give farmers advise on such issues as early planting and correct spacing of field crops and control of soil erosion by putting contour. To ensure that the advise is followed, the officers make frequent visits to farmers and also assess farmers trainings done at every Village Extension Group farmers (VEG) centre. The farmers in the area also attend agricultural shows organised by the group of farmers and extension officers at the farm centre.

There are however, problems that the extension officers face during their mobile courses, field days, study tour and demonstrations in zone areas. Some of the problems that were outlined by the extension officer includes:

(1) Ignorance: This is mostly experienced during peak periods such as planting of crops, weeding and harvesting. Each farmer is very busy during this time. Sometimes it could be due to funerals in those villages near the centre. Illness and hunger also gives problems to farmers hence low attendance. There is also fear of the unknown. This also contributes to low attendance. If the farmer does not know the ideas introduced during first time, cannot really agree to accept the new ideas. Questions may arise to say, "if I try it, will it be successful and if it is good who will be it first?" This implies that the farmers do not

just readily accept the new innovations.

- (ii) Distance between camp office and zone area: The extension officer also expressed that there is lack of transport to use during their services. Hence there is need to improve the transport system if the work of the Extension Officers is to be of good quality to the farmers. In cases where the bicycle is used, no spare parts are given for the bicycle.
- (iii) There is also lack of protection clothes used during demonstrations such as rain coats and boots. These are no longer given to the officers.
- (iv) Non loans recovery system: Some farmers do hide in fear of the old loans uncleared from the lending institutions, hence cannot attend the meetings.

CHAPTER SIX

6.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1 Discussions of results

The question of adoption of new techniques in agriculture among the subsistence farmers in the study area does not come in without the technology being socially and economically beneficial.

From the foregoing chapters, it leaves no doubt that the path to full adoption of new innovations is characterised by a process of trial and error, moving forward and backward until one is in such a position to make a final decision, farmers are only ready to change to something new if the adoption process does not involve a lot of risks. In most cases, farmers in the study area forge new techniques from their relatives by maintaining strong family ties whereby the fortunate and enterprising relatives share both their knowledge and equipment with the less fortunate relatives and neighbours.

Apart from strong family ties, farmers also acquire new innovations or modern techniques through attending agricultural meetings. In these meetings, an individual farmer may decide whether to adopt the new practice or not. However, according to the results obtained, very few readily accept the new innovation and put it into practice. But the most important point about these meetings, is that farmers

are exposed to new methods of cultivation such as contour ploughing, crop rotation, good spacing, implement usage, new hybrid seeds, fertiliser application and use of kraal manure. Hence, their agricultural activities to some extent are dependent on the exposure to new methods.

However, like in any other part of Zambia, in the study area, the use of improved implements also resulted from the white farmer's influence. The majority of the farmers aged between 40-60 years, showed that they inherited the implements from their fore fathers who acquired them from European settler farmers and mission stations. These farmers might have worked on the European farms and somehow through experience and observation acquired the implements and practice. They may have realised how beneficial the practice was.

Furthermore, in the 1980's the improved implements of agriculture and other forms of technology increased in number thereby flooding the market making it easier for each individual to have access to the use of implements. This was necessitated by the creation of NAMBOARD and co-operative unions which supplied inputs to the farmers. The farmers purchased inputs on loan and cash basis. Farmers who were unable to purchase the inputs in this manner always depended on relatives and neighbours for help. In cases where no assistance was rendered, farmers had to depend on hand tools to meet their demands. This is still the case in the study

area. Hand tools are however, much used when weeding, especially by women. But the most important thing among these farmers is that, there is a great tendency of copying or forging the farming practices among themselves; and this is diffusion of innovation. Usually the less advanced copy from the advanced ones and even in terms of help, it is the less advanced who ask for assistance in times of crisis.

The long periods of exposure to the same implements have led farmers to gain both skills and knowledge in the practice. Similarly the use of chemical fertilisers in the area that were made available by Namboard and co-operative union led to the farmers to adapt the new methods and this have actually influenced crop production in the area. Farmers were motivated to grow more especially during the subsidy period. Hence the creation of subsidies encouraged farmers to accept or adapt the new methods of agriculture as they saw them to be beneficial economically. Farmers were made aware of the advantages of using chemical fertilisers and improved implements, as a result 76% of the farmers in the study area, on the average, have adopted the use of improved implements (see Figure 3) as compared to 30%, on the average, in the colonial period.

Similarly, about 61% of farmers, now, use official hybrid seeds in the survey area as compared to 37% before independence (see Fig. 6). Farmers expressed worries in cases where the hybrid seeds were not delivered in the area

or delivered late. This is because their crop production was affected to a larger extent. For instance, this resulted in low yields.

The wide spread use of hybrid seeds which is 62.5% on the average, by farmers, indicates the willingness of farmers to adapt to new changes in agriculture. However, in cases of crisis, 37.5 % of farmers use non-hybrid seeds or non-official seeds to meet their requirements. This implies that at one point in time, a farmer is forced to use traditional methods.

The farmers in the survey area expressed that they preferred the use of chemical fertiliser to kraal manure despite that kraal manure is cheaper to obtain. Most of the respondents expressed that kraal manure is usually accompanied by a lot of weeds which require a lot of labour. However, in the absence of chemical fertiliser, farmers apply kraal manure but kraal manure is not a very new innovation to the farmers. Farmers expressed that the practice started as a result of mission teaching around 1930s and 1940s. The wide spread adoption of the practice is, however, partly the result of necessity and partly due to intensive propaganda by the agricultural department.

The value of manure is now unquestioned by the majority of the farmers, a very striking change. Many farmers expressed doubts as to its efficacy or were afraid to use it because of weeds. Manure is used not to maintain but to

restore a minimum of fertility, and it is commonly applied only to the poor parts of the plots and not in regular and uniform manner. To most of the farmers in the area, the practice of manuring is not an essential part of good husbandry but an unnecessary hardship forced upon them because they have been deprived of access to chemical fertilisers especially for the past two planting and growing seasons. The adoption of new ideas in the survey area is through family discussion. Family members especially extended families discuss matters pertaining to, how to prepare for the next season and the methods to apply, with the changing environmental conditions. Secondly ideas are passed on from one farmer to another through meetings held at every Village Extension Group farmers (VFG) centre in the area. Thirdly, ideas are acquired by listening to agricultural Tonga programmes on radio. With these ideas in place, the activities of farmers in agriculture are bound to change either for better or worse.

The presence of the Kanchomba agricultural camp in the area, in relation to the 75% of the farmers that received formal education have also helped the adoption process. Farmers are able to understand the lessons given at Kanchomba agricultural centre by extension officers because 75% of them did formal education. However, both female and male farmers are able to handle modern farm tools without much difficulty.

4.2. Conclusion

It has been shown from the research findings that small scale (subsistence) farmers in Kanchomba have adopted the new methods of agriculture since the colonial period. This is evident in that farmers use ox-drawn implements, hybrid seeds, and apply chemical fertilisers. Similarly, the Literature Review indicates that these small-scale farmers started to adopt the new methods during the colonial period and this is partly due to the European settler farmer's influence.

The adoption of new ideas and innovations as regards to agriculture, were also facilitated by the government efforts through the provisions of the extension services, and by making inputs available to the small-scale farmers either on loan or cash basis. Generally, inputs were subsidised during the second republic to make it possible for the small-scale farmers to purchase them at a low price. This, actually, motivated farmers to grow more for both cash and consumption. Similarly, the Data analysis also shows that some simple and manageable services are rendered to farmers by the extension officers. These services includes the provision of technical information on how small-scale farmers can best manage their farming activities with regard to fertiliser application, choice of seed varieties, planting, weeding, harvesting and storage.

However, farmers complained that with the removal of subsidies, seeds and fertiliser prices began to rise such that about 20% of farmers are now unable to purchase the commodities. Furthermore, loans are no longer made available to farmers since the collapse of Choma District Co-operative Marketing Union (CDCMU) in the area. This has resulted into practicing both modern and tradition methods of cultivation in order to meet their demands. But farmers expressed that, tradition methods of cultivation are only done during the time of crisis.

Farmers have a great tendency to copy and forge farming practices among themselves and it is usually the less advanced farmers that copy and forge from their advanced friends or relatives either through discussions or observations made during the growing season. This all means that there is diffusion of ideas and innovations in the area.

The data analysis also indicated that 100% of the farmers use both an axe and a hoe and this implied that these are now widely used in the area unlike in colonial period. However, 86% use oxen together with 94% of the farmers using ox-ploughs. Similarly, 74% of the farmers use a cultivator for weeding apart from a hoe. Furthermore, 62.5% of the farmers use hybrid seeds of maize such as MM400, MM504, MM603 and MM604; and 75% apply chemical fertiliser. This shows that farmers have a liking towards

the improved methods of agriculture and hence have adopted the methods since the colonial period and the adoption process has increased since independence. However, farmers have continued to depend on family labour which account for 83%.

4.3 Recommendation

The following recommendations have been suggested in order for sustainable agriculture to take place in the study area and above all in order for the adoption of new methods to be effective.

There is need to:

- a) not only to promote hybrid maize as a cash crop, but also to research into and promote the cultivation of traditional crops which are adapted to the ecological environment;
- b) know the kind of agricultural innovations and ideas that can take place in an area, as not all agricultural activities are applicable to all areas. In other words, some innovations of agriculture may not work in a different ecological environment, and therefore, the need to understand the characteristics of each particular innovation of agriculture. This will enable farmers to have little or no problems in adopting those particular innovations;

- 2) equip the agricultural productive areas with adequate agricultural extension officers. These should be provided with proper transport in order for them to reach the desired targets and this will probably improve the performance of certain small-scale farmers as far as agriculture is concerned. This requires a strong linkage between village headmen and the agriculture extension officers, who educate farmers on the best methods to undertake.

- Mulla, C. (1986) A comparative analysis of factors affecting the use of hybrid maize among farmers of Mpika and Mkuhi districts. Ph.D. Thesis.
- PAM, (1993) Programme to prevent Malnutrition and End of Drought Report, PAM, Lusaka.
- Pangar, W. (1972) Settlement Schemes. University of London Press, London.
- Rees, M. (1958) An economic survey of plateau Tonga improved farmers. Lusaka, Zambia.
- Shila, W.F.C. (1983) Rural Development Studies Bureau: Available village farm technology, its contribution and limitations to rural agricultural development. Occasional papers UNZA, RDSB, Lusaka.
- Shila, D.T. (1971) "Administrative Divisions" in Davies, D.H. (ed) Zambia in Maps, London University Press, London.
- Wolfe, J.P. (1966) Peasants. Prentice Hall, Inc. New Jersey.
- Wood, A.D. (1990) The dynamics of Agricultural Policy and reforms in Zambia. Iowa, State University Press, Ames.

QUESTIONNAIRE FOR THE FARMERS

Interview Schedule Number: _____

Date: _____ Village: _____

SECTION A: SOCIOECONOMIC CHARACTERISTICS

1. The respondents:

(i) Sex: _____ (ii) Age: _____

(iii) Level of Education:

(a) Primary ☐ (b) Secondary ☐

(c) Vocational/University ☐ (d) None ☐

(iv) Marital status:

(a) Single ☐ (b) Married ☐

(c) Divorced ☐ (d) Widowed ☐

2. Farmer's place of birth:

(i) Chief: _____ (ii) District: _____

(iii) Country: _____

3. Period of stay in Kauchombaz:

(a) 1-3 years ☐ (b) 4-6 years ☐

(c) 7-9 years ☐ (d) 10-12 years ☐

(e) above 12 years ☐

4. Size of the household:

(a) 1-4 ☐ (b) 5-8 ☐ (c) 8-12 ☐

(d) above 12 ☐

SECTION B: CROPS GROWN

1. Types of crops grown during the farming season:

(a) Maize ☐ (b) Cotton ☐ (c) Groundnuts ☐

(d) Sunflower ☐ (e) others, specify: _____

2. Which crops do you give priority? Why? _____

3. For how long have you been growing these crops? _____

4. How good is your yields from maize?

(a) Average ☐ (b) Below average ☐

(c) Above average ☐

5. Do you sell food crops and to whom? _____

6. If yes to No. 5, why do you sell food crops? _____

SECTION C: FARM INPUTS

11. What implements do you use for farming?
(a) Oxen - how many _____
(b) Plough - how many _____
(c) Hoes - how many _____
(d) Specify any others _____
12. For how long have you been using these implements?

13. Do you have enough implements for ploughing?
(a) Yes [] (b) No []
14. If no. to No 13, what do you do to ensure that work on the farm is going on?

- 15(i) Do you use any fertilisers? (a) Yes []
(b) No []
- (ii) If Yes, specify (a) Basal dressing _____
(b) Top dressing _____
16. If no. to No 15(i) What do you use?

- 17(i) What type of hybrid seed varieties do you use?
(a) MM400 [] (b) MM504 [] (c) MM603 []
(d) MM604 [] (e) S.R.52 []
- (ii) Specify any others _____

SECTION D: FARMING SYSTEM

- 18(a) Do you have land in fallow? Yes [] No []
(b) If yes, why and for how long? _____
19. Do you plant one crop on a same plot year after year?
Yes [] No []
20. Give the reason for your answer in No. 19.

SECTION E: LABOUR AND OTHERS

21. Source of labour on the farm _____
22. Do agriculture extension officers visit you to give

advice? Yes [] No []

23 If no to No.22, do you then attend agricultural meetings or shows? Yes [] No []

24 If yes, what kind of information is rendered to you?
.....

25 Have you benefited from such information and in what way?
.....

QUESTIONNAIRE FOR AGRICULTURE EXTENSION OFFICER(S)

1 What is the estimate of the population of farmers in Kanchoha?

2 Do farmers request you for assistance?

3 Do you visit farmers and how frequent are your visits?
.....

4 What particular information do you look for when you visit farmers?

(a) Quality of crops [] (b) Techniques used []

(c) Specify any other

5(a) What advice do you give farmers?

(b) How do you ensure that they follow your advice and do you get any feed back from them?

6 Do you arrange inter-village meetings to discuss agricultural farming techniques?

Yes [] No []

7 If yes, how is the attendance of farmers?

8 What problems do you face as an agricultural officer when carrying out your duties?
.....

Thank you for assistance and co-operation.