

**A HISTORY OF MOUNT MAKULU CENTRAL RESEARCH STATION  
1950-1980**

**BY**

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## DECLARATION

I, **Dorothy Mwansa**, hereby declare that this dissertation represents my own work, and that it has not previously been submitted for a degree at this or another University.

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**APPROVAL**

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## **ABSTRACT**

This study is an attempt to examine the history of agricultural research in Zambia. To do this effectively, Mount Makulu Central Research Station has been chosen. This is because it has always been the most important agricultural research station in the country.

The study is divided into five chapters. The first chapter argues that despite being the country's Central Research Station, there has been no comprehensive historical study on its work. This has created a gap in the agricultural historiography of Zambia. This study, therefore, hopes to bridge the gap.

Chapter two argues that agricultural research in Zambia dates back to the early years of British South Africa Company rule of Northern Rhodesia. During the rule of the Company and British Colonial Office rule, many research stations were set up in the country. However, the myriad of problems they faced necessitated co-ordinated research in the territory. Therefore, the Central Research Station was established with the aim of solving these problems.

The third chapter focuses on the development of the Central Research Station from 1950 to 1980. We argue that within a thirty year scope, the station had grown both in size and strength.

Chapter four evaluates the work of the Central Research Station. Our argument is that despite the numerous constraints to its work, the Central Research Station had by 1980 recorded a number of successes.

Chapter five is the conclusion. The study concludes that a lot of agricultural research work was successfully conducted at the Central Research station from 1950 to 1980. Although some research findings did not reach the intended targets, those that did greatly transformed their lives and in most areas positively impacted on agriculture in Zambia.

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## **DEDICATION**

To my father, Mr. Roy Mwansa, my mother, Mrs. Rose Mwansa and also to my son,  
Muyuba Mudenda.

## **ABBREVIATIONS**

ARPT	Adaptive Research Planning Team.
ASSIP	Agricultural Sector Support Program.
BSAC	British South Africa Company.
FAO	Food and Agricultural Organisation.
FNDP	First National Development Plan.
GART	Golden Valley Agricultural Research Trust.
GRZ	Government of the Republic of Zambia.
LEGCO	Legislative Council.
NAZ	National Archives of Zambia.
NFIS	National Farming Information Services.
NORAD	Norwegian Development Agency.
NRG	Northern Rhodesian Government.
PEXCOS	Provincial Experimental Committees.
SIDA	Swedish International Development Agency.
SNDP	Second National Development Plan.
TNDP	Third National Development Plan.
UNESCO	United Nations Education Scientific and Cultural Organisation.
USAID	United States Agency for International Development.

## TABLE OF CONTENTS

	Page
DECLARATION.....	ii
ABSTRACT.....	iv
ACKNOWLEDGEMENTS.....	v
DEDICATION.....	vii
LIST OF MAPS.....	x
LIST OF ILLUSTRATIONS AND TABLES.....	xi
CHAPTER ONE: INTRODUCTION.....	1
CHAPTER TWO: AGRICULTURAL RESEARCH IN ZAMBIA	
PRIOR TO 1950.....	13
CHAPTER THREE: THE DEVELOPMENT OF MOUNT MAKULU	
CENTRAL RESEARCH STATION AND ITS	
AFFILIATE STATIONS.....	40
CHAPTER FOUR: THE IMPACT OF AGRICULTURAL RESEARCH	
WORK AT THE CENTRAL RESEARCH STATION	
ON AGRICULTURE IN ZAMBIA, 1950-1980.....	65
CHAPTER FIVE: CONCLUSION.....	86
SELECT BIBLIOGRAPHY: .....	91

**LIST OF MAPS**

**PAGE**

MAP 1: LOCATION OF MOUNT MAKULU CENTRAL  
RESEARCH STATION.....7

MAP 2: RESEARCH STATIONS SET UP PRIOR TO 1950 .....36

MAP 3: REGIONAL RESEARCH STATIONS AND  
RESEARCH SUBSTATIONS BY 1980.....59

LIST OF ILLUSTRATIONS AND TABLES	PAGE
FIGURE 1: MAZABUKA CENTRAL RESEARCH STATION (1929).....	22
TABLE I: REGIONAL RESEARCH STATIONS AND THEIR WORK.....	49
PROGRAMMES	
TABLE II: SEEDS SECTION, 1964-1980.....	78
TABLE III: PHYTOSANITARY SECTION, 1964-1980 .....	81

## **CHAPTER ONE: INTRODUCTION**

### **STATEMENT OF THE PROBLEM**

Agriculture has an important role to play as the source of livelihood for the majority of Zambians in rural areas. It also plays a vital role in related activities for the ever increasing urban population. Since independence, however, the overall performance of agriculture in Zambia has been poor, as the country has failed to be self sufficient in food production. In view of this poor performance of agriculture, one important question this study will address is the role agricultural research has played in improving agricultural production in Zambia.

Zambia has a long history of agricultural research. Before 1951, there was no formalised agricultural research in Zambia. However, from the 1920s, there was an extensive network of research stations and trial sites were also gradually built up covering the principal agro- ecological zones.<sup>1</sup> Economic historians, however, have paid little attention to examining the role played by agricultural research findings in the development of agriculture in Zambia. They have also ignored or treated summarily the work of Mount Makulu Central Research Station. It was from the Central Research Station that experimental work throughout the country was controlled and co-ordinated.<sup>2</sup> Although a number of studies exist focusing on agricultural development in Zambia, there has been no detailed study on the work of the Central Research Station. There has also not been any detailed documentation on the work of its affiliate stations with whom it liaises. The lack of detailed studies on the Central Research Station has created a gap in the agricultural historiography of Zambia. It is for this reason that this study endeavours to fill this gap.

## LITERATURE REVIEW

Many studies exist on the development of agriculture in Zambia. One noticeable thing, however, has been the failure to document the relationship between agricultural practices and agricultural research into those practices. A survey of literature indicates that no comprehensive piece of work has been written on agricultural research in Zambia. As will be shown for many studies, the work of the Central Research Station was just mentioned in passing.

Baldwin's study was relevant to this study. However, it was silent on issues pertaining to agricultural research. His argument was that in the colonial era, contrary to claims of European farmers, African farmers responded positively to feasible opportunities to utilize improved techniques in agriculture. He attributed the failures in agriculture in the country to soil conditions and plant diseases.<sup>3</sup> His study provides the basis for investigating into the role played by the Central Research Station in addressing such failures in agriculture.

Another illuminating work to this study was the study by Makings. He acknowledged the fact that Zambia had a long history of agricultural research by alluding to the fact that as early as 1929, the Department of Agriculture was undertaking investigations into pest and disease problems through a new research laboratory opened at Mazabuka in the same year.<sup>4</sup> He further observed that under a 10 year plan in agriculture from 1947-1957, an agricultural research scheme was launched. Makings did not, however, mention the launching of Mount Makulu Central Research Station under the scheme.

Lombard, Tweedie, Ballantyne and Chipungu attempted to investigate the successes and failures of the Central Research Station. Lombard and Tweedie evaluated

the work of the Central Research Station and hailed it for its successes. While accepting the fact that agricultural research had given answers to the agricultural problems facing Zambia, they argued that there was an unusually wide gap between achievements on the Central Research Station and on the average farm.<sup>5</sup> Ballantyne was of the view that the research branch had by 1966 contributed to the republic's agricultural prosperity.<sup>6</sup> Chipungu's study on the peasantry in the Southern Province shared the same views as Lombard, Tweedie and Ballantyne. He hailed the peasants of Southern Province for responding positively to research findings. He however lamented that from 1976 to 1980, the economic crisis reduced the state's ability to continue with the tradition of providing agricultural technology.<sup>7</sup> The significance of these three studies was that they raised the question of the successes and failures of the Central Research Station.

Klepper, Hellen, Eylands and Patel argued that research and extension in colonial Zambia were basically designed to benefit European settler farmers. Klepper argued that in the colonial era, virtually no extension services were available to African farmers which led some Africans to adopt advanced technology by imitating the European farmers.<sup>8</sup> Hellen argued that during the Federal era, the African was not allowed to participate fully in the cash economy. He further mentioned that only at the close of colonial rule did development planning reach the rural areas of Zambia.<sup>9</sup> Eylands and Patel also concluded that agricultural research in the colonial period supported the commercial production of crops grown by European farmers.<sup>10</sup> These scholarly observations provided the basis for researching into government policy vis-à-vis agricultural research in colonial and independent Zambia.

Of significance to our study were the studies by Mwila and Dodge. In his attempt to investigate who the beneficiaries of agricultural research findings in independent

Zambia were, Mwila concluded that in post-independent Zambia, it was the commercial and emergent farmers who had access to better agricultural services. He further observed that policy pronouncements in favour of the traditional sector were repeatedly contradicted by actions in favour of commercial and emergent farmers.<sup>11</sup> Dodge shared the same view. Her argument was that after independence, information appeared particularly sparse on the most profitable amounts and types of fertilizers for particular smallholder crops in various areas.<sup>12</sup> The two studies helped us identify the types of farmers who benefited most from the Central Research Station's research findings.

These studies did not provided a detailed account of the history of the Central Research Station. They however, provided us with background information which was of great help in our study. There were many books dealing with various aspects of agriculture that we consulted. However, they were not directly relevant to our study. Such books include William Allen's *The African Husbandman*.

## **HISTORICAL BACKGROUND**

In the period after 1935, Britain started facing serious African resistance to her colonial rule. As a result of increased nationalist movements in her colonies, in February 1943, Britain announced her policy on Colonial Development and Welfare.<sup>13</sup> Later, a legal frame work was put in place and gave birth to the Colonial Development and Welfare Act. The Act included a provision for the expenditure in any one year on "research and investigation of such sums not exceeding 500,000 Pounds as parliament might approve".<sup>14</sup> Agricultural research was included. However, not much was done in the way of serious support for scientific agricultural research at the time. This was due to the Second World War on which most funds were expended.

After the war, the financial position of the British government improved considerably. This was because among other things, copper prices were high on the world market. Northern Rhodesia, one of her colonies produced a lot of copper.<sup>15</sup> Favourable effects of post-war devaluations of the Pounds Sterling (hereafter known as Pounds) upon the world price of copper further led to an increase in funds. In response to its favourable financial position, the British government increased its level of public investment in the rural sector of its colonies. To do this properly, it approved a Ten Year Development Plan in agriculture from 1947 to 1957 in the colonies. Emphasis was on the rural sector because of this sector's production potential. Vaughan made this point clear when she stated that :

Rural East and Central Africa were seen as having the potential to produce more dollar earning cash crops and money from the Colonial Development and Welfare Fund was directed towards raising the incomes and the income producing capacity of rural dwellers.<sup>16</sup>

In 1945, Provincial Commissioners in Northern Rhodesia were issued with copies of the Colonial Office statement on Colonial Development and Welfare together with a memorandum on African Development Planning. They were further asked to arrange for the preparation of District and Provincial Development Plans. In what was to be the first effort at long term planning on a national scale, Makings noted, "they were required to consult with Africans, missionaries and other "non-officials".<sup>17</sup> For Northern Rhodesia, by April 1945 the preparation of the first colonial plan was completed.<sup>18</sup> On 11th February, 1947, the Ten Year Development Plan was approved.<sup>19</sup>

The essence of the ten year scheme put forward by C.J. Lewin, the Director of Agriculture, was for a progressive and considerable increase in extension services with the emphasis on African agriculture. Under the scheme, proposals were also made for an increase in agricultural research. This was reflected by C.F. Clay, the Joint Adviser on

Development to the Governments of Northern Rhodesia and Nyasaland in a memorandum in 1945. He stated that :

In this memorandum, I have referred to the need for research which I consider as a basis for the development of rural areas.<sup>20</sup>

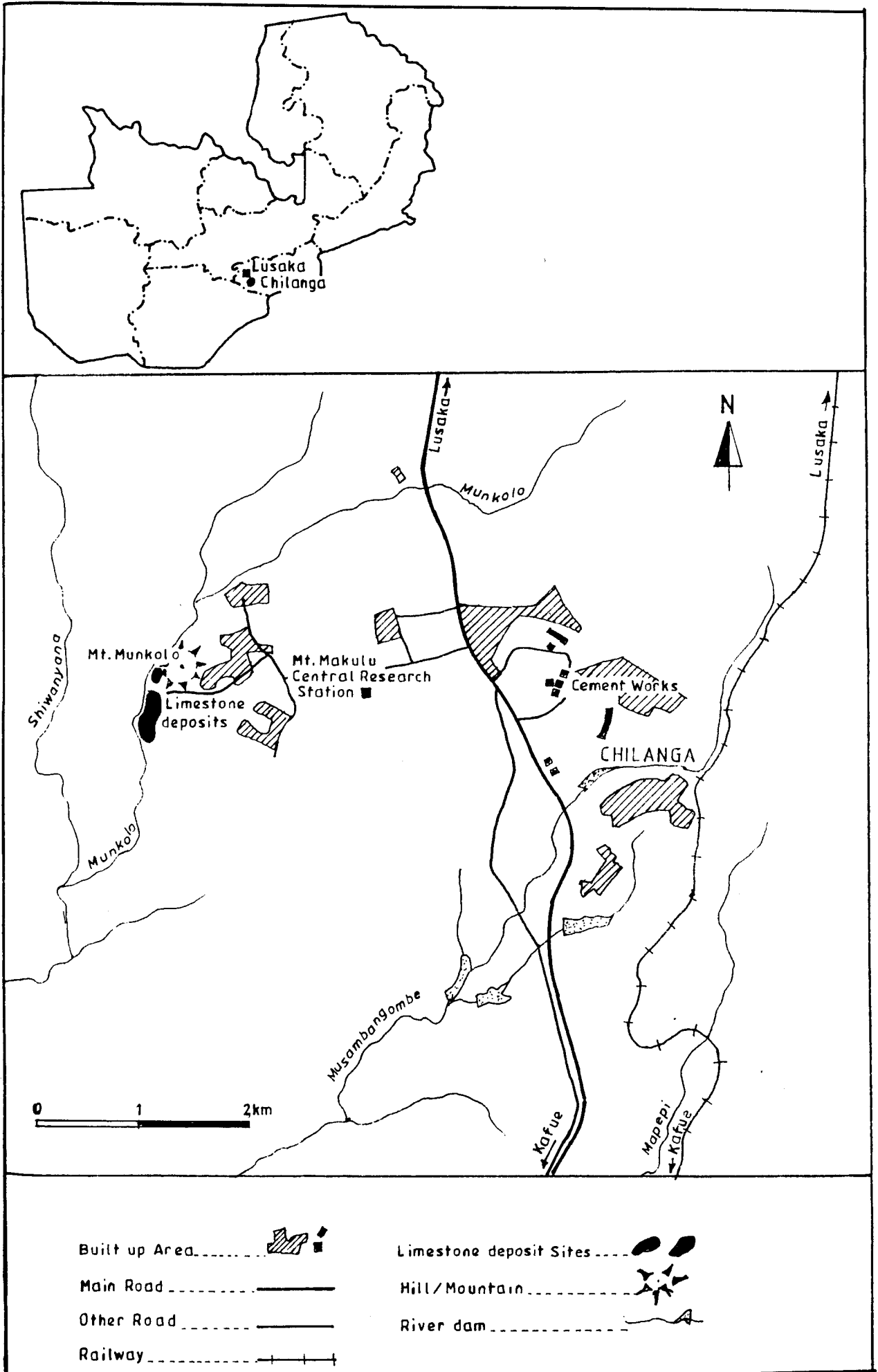
The establishment of the station was a practical expression of this desire for increased research into agriculture.

In Northern Rhodesia, the establishment of a Central Research Station was considered a matter of urgency. There were many agricultural problems requiring attention. Observations from scattered experiments made by District Agricultural Officers provided insufficient information. These District Officers had too many duties to perform. Consequently, it became increasingly difficult for them to give adequate attention to experimental programmes.<sup>21</sup> By 1950, Northern Rhodesia had only two research workers - the Ecologist and Soil Chemist.<sup>22</sup> Agricultural staff had been undertaking simple and "ad hoc" trials and experiments at Departmental Stations. Therefore, farmers did not have the specialist advice and assistance normally regarded as essential in agricultural countries.

The establishment of the station was approved under the Colonial Development and Welfare Act in 1950. The government of Northern Rhodesia purchased a site for the establishment of the station in the same year at Mount Munkolo in December, 1950.<sup>23</sup> The site was originally a farm located in Chilanga, 16 kilometres south of Lusaka on the main Lusaka-Kafue road, and 1.5 kilometres west, off the main road (for details see Map 1). The farm belonged to Mrs. Rocher, a Dutch who had settled in the area in 1909.<sup>24</sup>

Many factors were taken into consideration when choosing the site. One factor was its proximity to the Chilanga Cement Factory which was to be the only source of electric power for the station. It was also easy to develop the site because it was an

Map 1: Location of Mount Makulu Central Research Station



already developed farm. Being just off the main road and within reasonable distance of Lusaka, the farm could easily be accessed by agricultural officials and was also near Lusaka, a large market in terms of European farmers, the main clients for the Station. The central location of Lusaka meant that research staff would easily access areas where they would inspect and superintend plots in different parts of the country. At that time, Lusaka was the most important European farming district and expansion in agricultural development was in the Lusaka-Chisamba-Broken Hill areas.<sup>25</sup> The proximity of the site to Chilanga Game and Tse-tse Control Department, just over a kilometre south of the Chilanga Police Station on the main road was an added advantage. It meant close contacts would be maintained between scientific staff of that department and staff of the Research Station. The soils at the site were good with few limestone outcrops.

The government of Northern Rhodesia provided the initial capital for the purchase of the farm. The 2,800 acre (1,100 hectare) farm was bought at a cost of 345,750 Pounds.<sup>26</sup> In 1950, the Secretary of State made a Colonial Development and Welfare Grant of 217,228 Pounds for setting up agricultural research services in the country, of which 134,228 Pounds was allocated for the establishment of the Mount Makulu Central Research Station and three substations.<sup>27</sup> The Central Research Station was set up at a cost of 77,044 Pounds.<sup>28</sup> The three substations, that is Mumbwa, Mazabuka and Bangweulu were set up at a cost of 57,684 Pounds.<sup>29</sup>

Agricultural research work at the station began in 1951. But it was officially opened four years later on 17th March, 1955 by Sir Arthur Benson, the Governor of Northern Rhodesia.<sup>30</sup>

## **RATIONALE**

The rationale for undertaking this study is three-fold. Firstly, it is hoped it will contribute to the already existing literature on the agricultural historiography of Zambia. Secondly, being a pioneering study on the history of agricultural research in Zambia, it is hoped it will contribute to the understanding of colonial and post-colonial policies vis-à-vis agricultural research in Zambia. Thirdly, it is hoped it will stimulate further research by students of economic history and other interested scholars.

## **OBJECTIVES OF THE STUDY**

The study has five objectives. Firstly, it attempts to identify the major researches that were carried out in Zambia prior to the setting up of the Central Research Station. Secondly, it seeks to identify the major researches that were conducted at the Central Research Station from 1950 to 1980. Thirdly, it seeks to establish the extent to which the Central Research station liased with the Extension branch of the Department of Agriculture and with its affiliate stations in reaching out to intended targets. Fourthly, it tries to identify the major bottlenecks that hindered research findings from reaching the intended targets. Fifthly, it attempts to identify the areas that benefited most from the station's research findings.

## **METHODOLOGY**

The first part of our research was done at Mount Makulu Central Research Station. We collected published and unpublished data from the Central Research Station. These included Annual Reports from the Ministry of Agriculture, Annual Reports of the Research Branch and Reports from some sections of the Central Research Station. We also conducted two oral interviews at the Central Research Station. Our research at the

Central Research Station lasted from October to December, 1999. From January to March, 2000 we devoted our time to collecting material from the National Archives of Zambia. The last part of our research took place from the end of March to June, 2000. A number of published and unpublished documents were consulted in the University of Zambia Library. During the same period a number of interviews were conducted in Lusaka and at the Central Research Station at Chilanga. The oral sources are considered reliable for this research because most of the people interviewed are directly involved in research work at the Central Research Station. Some of them have been working at the Central Research Station for many years and have, therefore, witnessed the development of the Central Research Station from a small Station to a large one, affiliating a number of Substations and Regional Research Stations.

## **ORGANIZATION OF THE STUDY**

The study is divided into five chapters. The first chapter is the introduction. The second chapter focuses on agricultural research in Zambia prior to 1950. The third chapter examines the development of the Central Research Station from 1950 to 1980. The fourth chapter examines the impact of the Station's work on agriculture in Zambia. The final chapter is the conclusion.

The study begins at 1950 because this was the year when the Colonial Development and Welfare Act approved the establishment of the Station. It ends at 1980 because this particular year marked a major turning point in the history of the Station. It achieved its aim of addressing the major problems of all classes of farmers. The Adaptive Research Planning Team (ARPT) was incepted as a branch of the Station. With its inception, problems of the small-scale farmers who had hitherto been ignored began to be seriously addressed.<sup>31</sup>

## ENDNOTES

1. Vaj J. Eylands and Bharati K. Patel, 'Agricultural Research', in Adrian P. Wood, Stuart A. Kean, John T. Milimo and Dennis Michael Warren (eds), *The Dynamics of Agricultural Policy and Reform in Zambia* (Iowa: Iowa University Press, 1990), p.307.
2. Northern Rhodesia Government, Department of Agriculture, *Annual Report for the Year 1955* (Lusaka: Government Printer, 1956), p.13.
3. E.R. Baldwin, *Economic Development and Export Growth: A Study of Northern Rhodesia 1920-1960* (London: Cambridge University Press, 1966), p. 142.
4. S.M. Makings, *Agricultural Change in Northern Rhodesia 1945-1965* (Berkeley: Food Research Institute, 1966), p.198.
5. C.S. Lombard and A.H.C. Tweedie, *Agriculture in Zambia Since Independence* (Lusaka: National Education Company of Zambia, 1972), p.84.
6. A.O. Ballantyne, 'Research is vital to the process of agriculture', *Farming in Zambia* 1,5 (1966), 5.
7. Samuel N. Chipungu, *The State, Technology and Peasant Differentiation in Zambia: A Case Study of the Southern Province 1930-1986* (Lusaka: Historical Association of Zambia, 1988), p.193.
8. Robert Klepper, 'Zambian Agricultural Structure and Performance', in Ben Turok (ed), *Development in Zambia* (London: Zed Press, 1979), p. 138.
9. John A. Hellen, *Rural Economic Development in Zambia 1890-1964* (London: C.Hurst and Company, 1968),p.270.
10. Eylands and Patel, 'Agricultural Research', p.311.
11. Chungu Mwila, 'The Adoption of Improved Agricultural Technology on Farms in Zambia', Ph.D Thesis, University of Bradford, 1986, p. 89.
12. Doris Jansen Dodge, *Agricultural Policy and Performance in Zambia* (Berkeley: University of California, 1977), p.288.
13. Bornard L. Mwape, 'Zambia's Agricultural Policy and Performance 1960-1980', Ph.D. Thesis, University of Pittsburgh, 1984, p.51
14. C.Y Carstairs, 'Colonial Research' *African Affairs*, 44, 174, (1945), 19.
15. C.J. Lewin, *Agricultural and Forestry Development Plans* (Lusaka: Government Printer, 1945), p.32.
16. Megan Vaughan, 'Exploitation and Neglect: Rural Producers and the State in Malawi and Zambia', in David Birmingham and Phyllis Martin (eds.), *History of Central Africa: The Contemporary Years Since 1960* (New York: Addison Wesley and Longman Ltd., 1998), p 170.
17. Makings, *Agricultural Change in Northern Rhodesia, 1945-1965*, p.205.
18. Mwape, 'Zambia's Agricultural Policy and Performance 1960-1980', p.51.
19. Northern Rhodesia Government, *Legislative Council Debates*, 30th November, 1946 to 12th February 1947 (Lusaka Government Printer, 1947), 779.

20. C.F. Clay, *Memorandum on Postwar Development Planning in Northern Rhodesia* (Lusaka: Government Printer, 1945), p. 23.
21. Eylands and Patel, 'Agricultural Research', p.307.
22. N.A.Z., MAG 2/8/8, 'Research Plans.' 13-10-50.
23. Northern Rhodesia Government Department of Agriculture, *Annual Report 1951* (Lusaka: Government Printer, 1952), 20.
24. N.A.Z. KSA 6/1, Chilanga District Notebook.
25. N.A.Z. M.A.G. 2/8/8, 'Notes on Proposals for Agricultural Research in Northern Rhodesia.'
26. N.A.Z., M.A.G., 2/8/8, From Director of Agriculture to Director of Lands and Surveys, 15th November, 1950.
27. N.A.Z. M.A.G. 2/8/8, Revision of the Northern Rhodesia 10 year Development Plan-Colonial Development and Welfare Scheme-R416.
28. Northern Rhodesia Government, Department of Agriculture, *Annual Report, 1950* (Lusaka: Government-Printer, 1951), 14.
29. N.A.Z., M.A.G. 2/8/8, Revision of the Northern Rhodesia 10 year Development Plan.
30. Northern Rhodesia Government Department of Agriculture, *Annual Report, 1955* (Lusaka: Government Printer, 1956), 20.
31. M. Ndiyoi and M. Phiri, 'Institutionalization of the Farming Systems Approach in Zambia', in Ponniah Anandajayasekeram and Ted Stilwell (eds.) *Institutionalization of Farming Systems Approach in Eastern and Southern Africa* (Mbabane: The Southern African Association for Farming Systems Research - Extension, 1988), p.222.

## CHAPTER TWO

### AGRICULTURAL RESEARCH IN ZAMBIA PRIOR TO 1950

This chapter examines agricultural research prior to the setting up of Mount Makulu Central Research Station. An examination is made of the type of support that was given to agricultural research by the British South Africa Company and the British Colonial Office. The main argument is that realization of the importance of agricultural research was noted by the Company before the outbreak of the First World War. Research into agriculture was critical at this stage, especially to the settler community that was alien to both the environment and the local crop varieties. We also argue that there were visible efforts by the Company and the British Colonial Office to promote agriculture through co-ordinated research. Agricultural prosperity, particularly before 1930, was minimal due to numerous constraints faced in a new environment. We also discuss the activities, successes and failures of the research stations opened between 1912 and 1950.

The period under review has been subdivided into two chronological periods. The first, from 1890 to March 1924 covers the period of the British South Africa Company rule. The second covers the period of direct British Government rule, from April 1924 to the inception of the Central Research Station in 1950.

#### **The British South Africa Company And Agricultural Research, 1890 – 1924**

The British South Africa Company was a chartered company that was formed in 1889 by John Cecil Rhodes. It was a commercial company that was given the mandate to operate in Central Africa by the British Government. In addition to operating as a commercial venture, the Company was granted permission to govern Central Africa from

1889. In this regard, the Company administered Northern Rhodesia from 1890 to 1924. The Company's occupation of Northern Rhodesia was encouraged by earlier optimistic reports of the presence of minerals in the country. The Company hoped to get profitable business in mining and pay for the cost of administering the country.

The Company's dream of Northern Rhodesia as another Rand was shattered when, to its disappointment, it became apparent that although Northern Rhodesia had mineral resources, their inadequate subsurface exploration and extraction would be expensive and the results would be uncertain because the richness and abundance of the ores were not known.<sup>1</sup> Besides, some known mineral ores proved to be of low value. Commenting on the low value of Northern Rhodesian copper ores, Bancroft stated that :

Numerous mining men who from 1905 to 1926, examined the relatively low grade oxide copper ores of the outcrops of the Roan Antelope, Nkana South, Chambishi and the first discoveries at Nchanga, considered them to be of very little or no value.<sup>2</sup>

The unpalatable mineral situation in the country forced the Company to direct its financial attention to the development of the wealthier Katanga reserves in Belgian Congo, north of the country.

In the absence of mineral development, the Company realized that the country's future was in agriculture. Beginning from around 1908, there was an influx of settlers into Northern Rhodesia. Most of them were Afrikaans-speaking people who were originally from South Africa. They settled in Southern Rhodesia but were being squeezed out of the land market because of the rising prices of land there. At first, the British South Africa Company's attitude to these settler farmers was not favourable. This was out of its wish to be the only one to maintain all land rights in the country. However, when few mineral deposits were found, the Company began to encourage settler farmers. It began to see settler agriculture as a way of generating revenue for the territory through

freight charges on settler farmers using its railway line exporting food to the Katanga mines. Lukanty and Wood note that the other reason for the Company's encouragement of settler farmers in the country was its perception of African farming as 'primitive and incapable of producing sufficient regular surplus for sale.'<sup>3</sup> Therefore, agriculture was seen as a possible solution to the Company's serious financial problems at this time. Administrative expenditure kept on exceeding its revenue annually. For instance, the annual deficit for North-Western Rhodesia alone, for the year 1909 to 1910 was estimated at £28,814.<sup>4</sup>

In order to attract many settler farmers in the country, the Company embarked on a deliberate policy of selling them land cheaply. Jones notes that Coryndon, the first administrator of North-Western Rhodesia, was happy with the policy because it eventually brought indirect benefits to the country through 'increased revenue from land sales, customs duties and cheaper food.'<sup>5</sup> By 1912, it was clear that the Company was using land as a source of profit.

Initially, most of the settlers came to occupy the land in the Lusaka – Chilanga area. Others pioneered settlement in the areas of Kafue and Mazabuka. This was primarily because these areas were and still are on the line of rail and with very productive soils. The farmers aimed at supplying their produce to the mines in Katanga and areas north of Kafue River where lead, zinc and copper were being mined. And while many of them concentrated on maize and cattle production, a few experimented with fruit, cotton and tobacco growing. To their disappointment, however, these early trials were not successful. The major problem was crop pest, a chronic ecological factor which at the time was very difficult to scientifically combat. By 1912, for instance, cotton had been attacked by a notorious pest, the boll weevil and consequently its cultivation seemed

unpromising.<sup>6</sup> To make matters worse, most of these settlers lacked both agricultural experience and knowledge of the local environment. Therefore, they farmed on a trial-and-error basis. We argue that it was these early failures in agriculture by settler farmers that prompted the British South Africa Company to embark on a process of fostering agriculture through research by setting up research institutions which, hopefully, would address the numerous problems faced by the settler farming community.

The first Research Station in the country was opened by the British South Africa Company at Chilanga in 1912. The station was in the form of experimental gardens and as such, work at Chilanga Experimental Station was almost entirely of experimental nature. Tree crop production was one area of concentration. Trees such as the Eucalyptus, Cypress and Mimosa were introduced in the area.<sup>7</sup> Crops such as maize, groundnuts and coffee were tested at the station for yield potential and resistance to diseases. Before 1929, laboratory services were not available in Zambia. In consequence, laboratory analyses were being done in Salisbury, Southern Rhodesia. The Company's Secretary of Agriculture seems not to have been worried by the lack of laboratory facilities in the territory when in 1915 he reported that :

The present development of the country does not warrant the establishment of a fully equipped department with its scientific branches such as agricultural chemist, entomologist . . . valuable assistance is being rendered by the staff of the Agricultural Department, Salisbury especially with regard to the analyses of soils, entomological and botanical researches.<sup>8</sup>

The infant station was quite successful in the first four years of its existence. Passing through Chilanga in 1916, the Secretary of Agriculture remarked, 'I have never seen better growth anywhere than we have at Chilanga!'<sup>9</sup> Occasionally, farmers visited the station and greatly appreciated its work. Pleased at the positive impact of the station's work on the farming community, the Secretary of Agriculture in 1919 went so

far as to remark that, 'experiments being conducted here are of a very considerable value to the country and to the farming community and this must not be overlooked!'<sup>10</sup>

The First World War was a temporary setback in the smooth performance of the station. Because of the war, many employees of the Station were sent to the war front. Therefore, qualified personnel were reduced in number. Because of this, some experiments were suspended. However, despite the war and some ecological problems the station encountered, its work led to improved agricultural standards by settler farmers. Commenting on the early trials at Chilanga Experimental Gardens, Hulcrow wrote in 1955 that :

Clearly, although it may not have been obvious, these early trials must have been extremely useful and the effect would have been profound if they had been continued up to now.<sup>11</sup>

The Chilanga Experimental Gardens were closed in 1929 after a fully-fledged Central Research Station was opened at Mazabuka.

Another area of agricultural experimentation during the era of the British South Africa Company was Mazabuka. As earlier alluded to, Mazabuka was another area where many settlers set up farms. The increased agricultural activities in the area prompted the British South Africa Company to embark on a process of researching into agriculture. An estate of 64,500 acres<sup>12</sup> jointly owned by the British Cotton Growers Association and the British South Africa Company was taken over by the latter to set up a research station called the Mazabuka Estate.<sup>13</sup> The station was opened in 1913 and agricultural experiments began immediately. Like at Chilanga, experimental work at Mazabuka Estate included the evaluation of crops such as groundnuts, beans, oilseeds and sugar-cane for yield potential and resistance to diseases. Maize experiments focused on discovering the varieties that were suitable to the varied conditions. From 1914, there

was an emphasis on experimentation with cotton. In this area, the results were very impressive as noted in the 1916 Report that ‘marvelous results had been obtained with regard to the yield, hardness and resistance against drought and cold.’<sup>14</sup> Despite enjoying a period of prosperity, the Estate had its own problems. During the period of the First World War, experimentation was slowed down. This was because many employees of the Estate were mobilized to fight in the war. At the end of the war, experiments were just conducted on a small scale.

After the First World War, the British South Africa Company’s interest in settler agriculture increased. The Company Board of Directors felt that with increased European immigration to Northern Rhodesia, the food requirements for the mining industry would be fulfilled.<sup>15</sup> Luckily for the Company, from 1919, there was a further influx of former soldiers along the line of rail between Livingstone and Kabwe. These had come under a settler scheme where ex-soldiers were attracted to Northern Rhodesia by gifts of large plots of land.<sup>16</sup> The population of European settler farmers rose at such a fast rate that, in the ‘1921 census, half of European males listing an occupation were farmers.’<sup>17</sup> Contrary to their expectations, the white settler farmers received inadequate returns from their ventures.

The British South Africa Company had high hopes for Northern Rhodesia as its ‘third Rand.’ But as Chondoka noted, such hopes were shattered when by the outbreak of the 1914 – 1918 war, ‘only lead and zinc mining at Broken Hill provided the major source for the Company’s revenue in the country.’<sup>18</sup> As the Company was essentially a mining corporation, when the mineral prospecting ventures did not fructify, the whole cost of developing the country was thrown into question. The Company did little to help the farmers. In the post war period, the Company faced serious financial problems and

its directors were contemplating quitting the country and were, therefore, not prepared to undertake any extensive enterprises. The Company focused its interest in investments that would quickly yield superior rates of return. Returns from agriculture proved to be minimal.

With increasing annoyance and despondence, the white agrarian community began pressing for, among other things, agricultural extension services and loans. They also advocated increased research into agriculture. Their demands, Chipungu noted, 'were expressed at agricultural shows, through the Livingstone Mail and wherever a farmer met another.'<sup>19</sup> Agricultural Shows were held in Kafue and Mazabuka from as early as 1917. The agricultural shows were also an opportunity to solicit government commitment to addressing the problems facing the white settler community. However, after the First World War, such a commitment was difficult to secure from the British South Africa Company which faced negative economic and political prospects. When in 1921 the Southern Rhodesian white settlers refused in a referendum to join South Africa, they also signaled the end of Company rule in Northern Rhodesia. On 7 April, 1924 the British South Africa Company handed over the administration of Northern Rhodesia to the British Colonial Office. It was now left to the new administration to address settler concerns about farming.

### **The British Government and Agricultural Research.**

We argue that unlike the British South Africa Company which was to some extent pessimistic towards ventures outside mining, the colonial government had different theoretical aspirations. It acknowledged some responsibility to advance the country in the field of agriculture. The first Governor of Northern Rhodesia, Sir H. Stanley and his successor, J. Maxwell were sympathetic to the economic problems of white settlers in the

country. In recognition of this fact, and as an attempt at solving agrarian problems in the territory, the government for the first time set up the Department of Agriculture in 1925.

Maxwell became the Governor of Northern Rhodesia in 1927. His belief was that many of the immediate economic problems facing Northern Rhodesia, particularly in agriculture were due to lack of scientific knowledge in handling them. He was of the view that to solve the multifarious problems facing the country :

A definite development plan should be drawn up and a Central Experimental Station should have links with two district experimental stations in North Eastern Rhodesia and the Tanganyika plateau.<sup>20</sup>

In its efforts to improve settler agriculture in the colony, the British government made available £160,000 to the settler farmers in 1929.<sup>21</sup> These funds were to be loaned out to farmers to assist them in agricultural developments in order to meet increasing market demands. The funds marked a major turning point in the history of settler agriculture in Northern Rhodesia. They were now hopeful that with the availability of funds they would advance agriculturally.

Following the views of Governor Maxwell, who emphasized on making agriculture scientific, more agricultural research stations were earmarked for opening in the country in order to improve the quality of agriculture. Indeed, before the outbreak of the Second World war, a number of agricultural research stations were opened up to beef up agricultural research and enhance agriculture in the territory. They included Mazabuka Central Research Station, Abercorn Experimental Station, and Fort Jameson Experimental Station. Others were Lunzuwa, Pemba, Kanchomba and Shiwang'andu Experimental Stations. These were opened primarily to serve the African population.

At the express wish of settler farmers in Mazabuka, a Central Research Station was opened at Mazabuka in 1929. This was an important development in the territory's

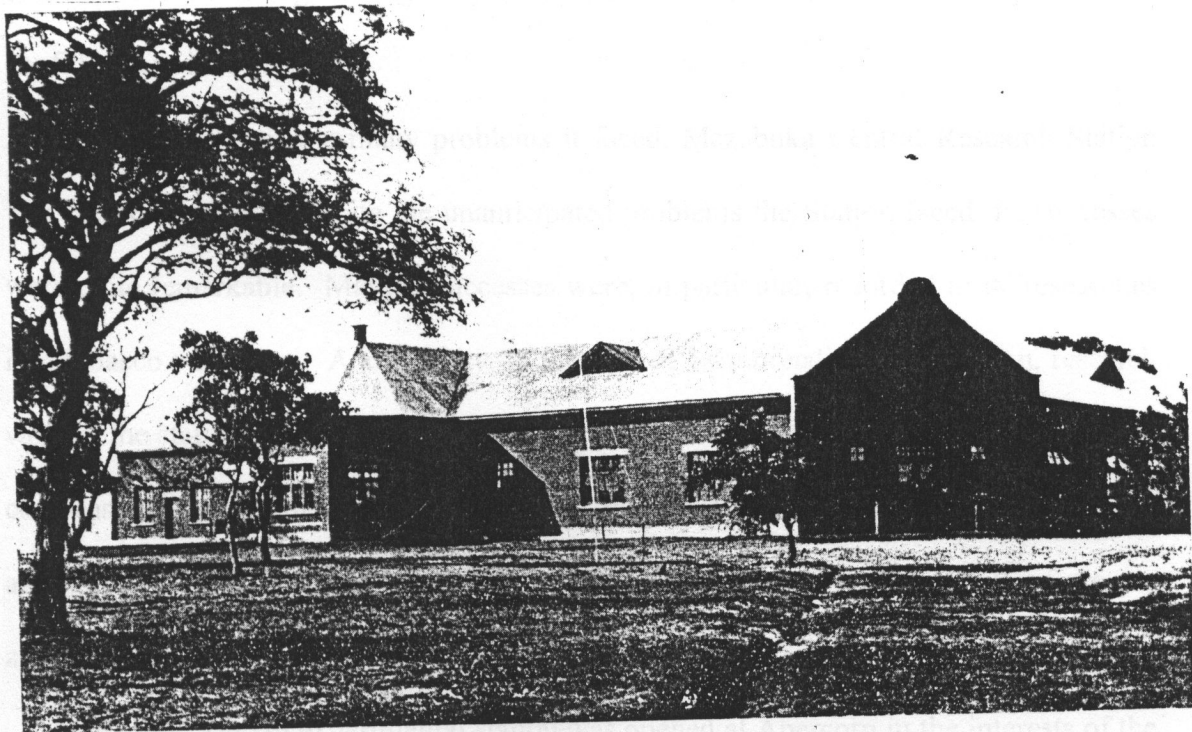
agricultural history. For the first time in the history of agricultural research, laboratory research work was now possible locally (see figure 1). With its inception, the Secretary of Agriculture noted cheerfully in 1929 that ‘the agricultural problems of the territory and they are many, can now be tackled in earnest!’<sup>22</sup>

The job description of researchers at Mazabuka Central Research Station among other things entailed experimentation on new varieties of cotton. They further sought to select and improve those varieties of tobacco that would find favour with the buyers.<sup>23</sup> Breeding of new varieties of tobacco and identification of plant diseases were also emphasized. Research into the restoration of soil fertility and plant breeding were also encouraged.

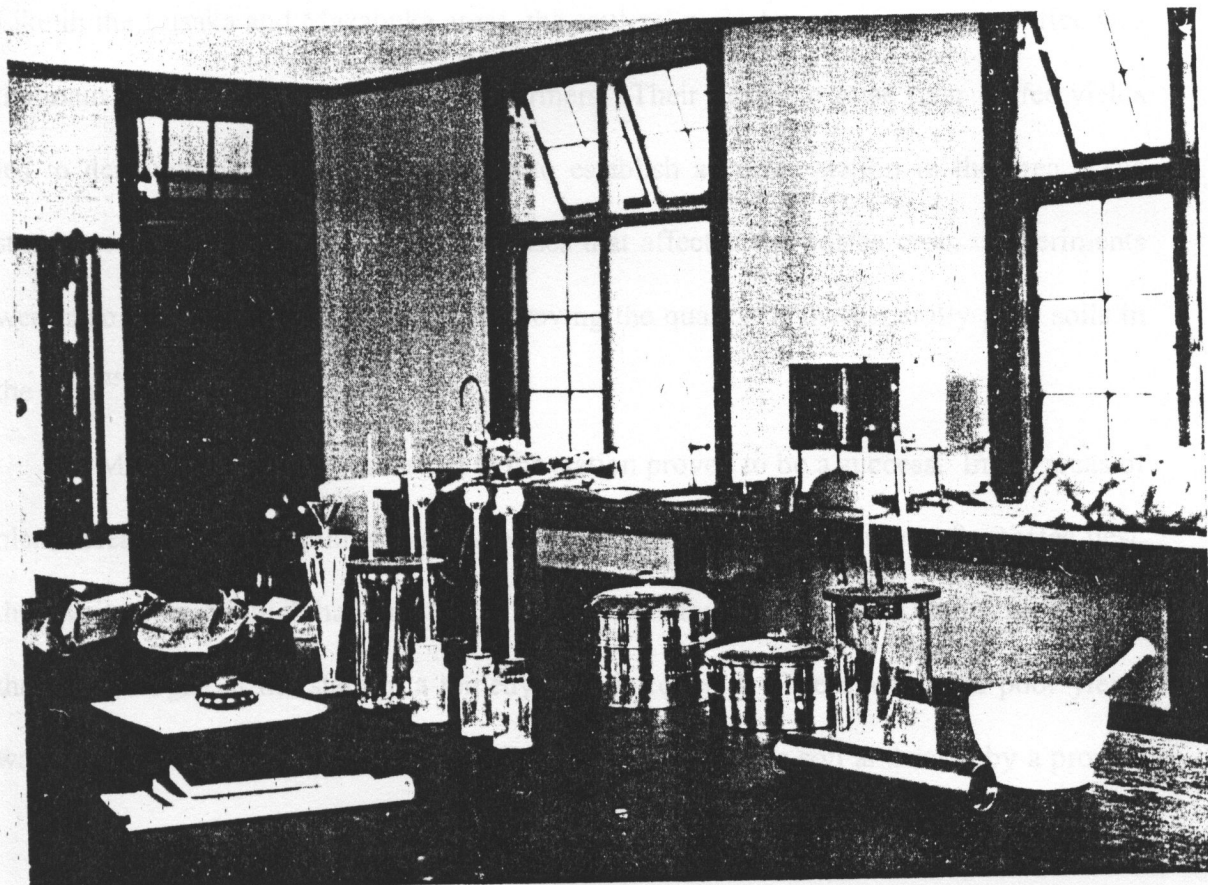
The Central Research Station’s path towards increased research into agriculture was smooth until the world economic depression in the 1930s brought to an end this period of prosperity. The depression deprived the government of revenue with which to do more than maintain the barest essentials in public services. With the exception of cotton work, the entire experimental programme at Mazabuka had to be abandoned.

The failure of the Station was also attributed to the lack of interest in its work by the settler farmers. Although they greatly advocated for its establishment, later they had no confidence in its work.<sup>24</sup>

FIGURE 1: MAZABUKA CENTRAL RESEARCH STATION (1929)



CENTRAL RESEARCH STATION. SIDE VIEW OF MAIN LABORATORY.



CENTRAL RESEARCH STATION. A PORTION OF ONE OF THE LABORATORIES.

The failure of the Station was also attributed to the lack of interest in its work by the settler farmers. Although they greatly advocated for its establishment, later they had no confidence in its work.<sup>24</sup>

As a result of the many problems it faced, Mazabuka Central Research Station was closed in 1935. Despite the unanticipated problems the Station faced, its successes were quite remarkable. Marked successes were, in particular, recorded in its researches into tobacco varieties. Additionally, in the area of crop breeding introduction, research work at the station yielded good results. New plants such as velvet beans, sweet potatoes, cowpeas and sorghums were introduced. Undoubtedly, being the first fully-fledged agricultural research station, Mazabuka Central Research Station was pivotal in fostering agricultural research in Zambia.

In 1929, a small experimental station was opened at Abercorn in the interests of the coffee planters. Abercorn was the main centre of settler activity in northern Zambia. Like in the Lusaka and Mazabuka areas, the settlers' mainstay was farming. Coffee was the main crop grown by the Abercorn farmers. Their desire to raise their coffee yields led to demands by the agrarian society to establish a coffee station in the area. The station sought to identify the major diseases that affected the coffee crop. Experiments were also being conducted aimed at improving the quality of the generally poor soils in the area.<sup>25</sup>

Many of the trials conducted at the station proved to be a success. In the areas of plant disease and entomology, success was shown by the identification of a coffee pest, the "white borer" which had practically destroyed many plantations. Due to the work of the entomologist at the station, a remedy was discovered. The question of poor yields was also successfully dealt with through the protection of the soil and roots by a process

called 'thatching'<sup>26</sup>. This process was copied from Kenya where it was quite successful. The process of thatching involved spreading a thick layer of thatching grass between the bushes. The soil would then be fertilised through the compost so formed and through the use of mixed fertilizers.

Despite achieving notable successes, some bottlenecks hindered the work of the station. The major drawback to research work was the poor climatic situation at Abercorn. Although during the rainy season, the area received a lot of rainfall, there still remained a long spell of dry weather in the winter months.<sup>27</sup> Consequently, during these months, the coffee crop existed on the inadequate moisture reserves in the soil. The economic slump of the 1930s also greatly interfered with research work at the station. Because of these problems, some settlers left the area and by 1938, there were only 17 remaining, most of whom were retired Administrative Officers.<sup>28</sup>

Another area of settler occupation where research work commenced during British government rule, was Fort Jameson. Tobacco growing at Fort Jameson began as early as 1913. By 1921, yields were so high that 'about 400,000 kilograms of tobacco were exported to the United Kingdom and this increased to 1,500,000 kilograms in the 1927 – 1928 season.'<sup>29</sup> Because of the tobacco boom the Assistant Agricultural Advisor to the Secretary of State strongly recommended that 'a research station be commenced at Fort Jameson at an early date.'<sup>30</sup> Consequently, Fort Jameson Experimental Station was opened in 1930. It was designed to serve both settler and African interests.

One of the principal objects of the station was to discover some methods of crop rotation and soil management whereby the productivity of the tobacco lands would be maintained indefinitely. The whole idea was to avoid the system of continually clearing new lands. Farmers were encouraged to plant leguminous crops to enrich the soils and

also for the purpose of showing the value of green manure to planters who, it was noted, maintained that tobacco extracted so much from the soil that animal manure or fertilizer could be of no use.<sup>31</sup>

Although the station's work proved to be of value to the settler farming community and to the country as a whole, several problems led to the slowing down of experimentation at the station. The slump of the 1930s led to the departure of most of the settlers. The outbreak of the Second World War in 1939 also had far reaching consequences on experimental work. As a result of the war, experiments in tobacco were suspended as a war measure. It was not until 1943 that experimentation was restored, though on a smaller scale.<sup>32</sup>

In the period before the slump research efforts had been mainly directed towards increasing production on settler farms. However, during the price slump, many settler farmers left the country, and in the hope of increasing crop yields, research into African agriculture was initiated. It was hoped that, with increased research into African agriculture, crop production would increase. Another reason for initiating research into African agriculture was the British government's perception that African farming methods were harmful to the soil. It felt the traditional farming system of 'slush and burn' led to soil erosion. This, it hoped, would be curbed through the setting up of African stations where, among other things, the Africans would be taught about how best to conserve the soil.

We contend that it was not solely the traditional farming systems that led to soil erosion but also certain policies introduced by the Colonial State. The Native Reserves policy, it has been argued, greatly led to soil erosion. Because of pressure from the settlers in the farming regions of Northern Rhodesia to alienate lands for settler

occupation, the British government had, in the 1920s agreed to the idea of setting up Native Reserves. Land Commissioners were appointed and deliberated without African participation between 1924 and 1927 to create 38 Native Reserves in three separate parts of the country.<sup>33</sup> In these reserves, conditions were chaotic. The reserves were overcrowded with livestock and human beings. Soil erosion, soil degradation, poor crop yields and famine became the order of the day in the reserves. To make matters worse, by the 1930s many ploughs were in use in Northern Rhodesia. With the aid of the ploughs, the Africans were able to cultivate large areas. This, in turn, led to over-cultivation and hence increased soil erosion. The Colonial State blamed the African for this, asserting that his agricultural practices were primitive and hence eroded the soil. The District Commissioner of Mazabuka on a tour of Mazabuka lamented about the plough, that :

Since the advent of the plough, natives have cultivated very much larger areas than they did with the hoe. The native is ploughing all available cultivable land... Natives should be taught superior farming... [such as] ploughing on contours (to prevent erosion) and proper use of kraal and green manure.<sup>34</sup>

We argue that, although the plough was introduced in the territory by the missionaries, later, the Colonial State began encouraging its use. The Native Reserves policy was also a creation of the Colonial State. This, then, implies that the very State was responsible for the problems that befell African farming. Before the introduction of the Native Reserves, the native agricultural practice of *Chitemene* (slush and burn) was very effective in the areas where it was practiced.<sup>35</sup> There was no scarcity of land. The African would therefore move to a new area when the soil became exhausted. Limited land in the Native Reserves meant grazing and cultivating in the same area for long periods. Ultimately, such a situation led to soil erosion. The ploughs introduced into Northern

Rhodesia were, undoubtedly, deleterious to agriculture. Commenting on the detrimental effect of the plough, Siamwiza observed that :

It soon aggravated soil erosion. Many plough owning households did not know how to use it. Instead of ploughing along the contours, they ploughed down the slopes causing gully erosion.<sup>36</sup>

The emergent problem of soil erosion called for the adoption of new techniques in agriculture. The problem of soil degradation also called for immediate attention. The government, unwilling to give Africans extra land, opted to include soil conservation in the lines of work envisaged for the African Agricultural Research Stations.

In 1936, three African stations were opened. These were Lunzuwa in the northern part of the country and Pemba and Kanchomba in the southern part of the country. In 1938, yet another Agricultural Research Station specifically for Africans was opened at Shiwang'andu in the northern part of the country.

The African stations were set up in the Native Reserves. Their work was basically the same. They all sought to demonstrate the prevention of soil erosion. There were also investigations and experiments to improve the quality of soil fertility through manuring and rotation of crops.

One striking observation at these stations was the change in attitude of some white Agricultural Officers, from intense dislike of the *Chitemene* system to partial acceptance of the same system. This came to the fore at Lunzuwa Experimental Station. As part of the station's research programmes, an experiment to assess the advantages of the typical *Chitemene* agricultural practice was conducted in 1939. The results of the experiment were so gratifying that the District Agricultural Officer at Abercorn was proud to state that :

The benefit of *Chitemene* practice lies in both the sterilising effect of the heat from the burning and also in the fertilising effect of the ash. The experiment proves the soundness of ordinary native practices over other modifications.<sup>37</sup>

Appreciation of African agricultural practices was also shown at Shiwang'andu where experiments were conducted to ascertain how grain crop production would be increased through the use of the *Chitemene*.<sup>38</sup>

The new techniques in African agriculture coming out of the research stations were met with resistance. The system of crop rotation, in particular, was received with mixed feelings. Many Africans felt it reduced the area under cultivation. This greatly annoyed the colonial administrators. During his tour of Mazabuka district, the District Commissioner complained that :

In refusing to accept the principle of rotation, they are placing a heavy strain on valuable land. The laborious change of ridging or grass strips from a compromise favouring the plough to a stricter adherence to the contour was probably as irksome as it was necessary.<sup>39</sup>

Even in other provinces, the response was poor. In the Eastern Province, for example, Africans showed no wish to emulate the new techniques that were being demonstrated.<sup>40</sup>

Clearly, these Experimental Research Stations set up in the Native Reserves proved to be insignificant to the majority of the natives. In the end, prosecution was employed as a way of compelling the Africans to co-operate, follow and practice the new agricultural methods of growing crops coming out as a result of research done at the stations. This was enforced through the use of chiefs who were instructed to prosecute anyone caught ploughing over grass strips. However, much to the surprise of the District Commissioner at Keemba Hill Chief Choongo showed reluctance in prosecuting 19 offenders who had ploughed over grass strips.<sup>41</sup> This was an indication that even chiefs

disagreed with the system. The traditional system of agriculture had been held in high esteem. The African was not ready to abandon it for new technology. In consequence, research into African agriculture was not as successful as anticipated because of African resistance to expensive and labour intensive farming methods.

In the period from 1930 to 1943, due to the economic depression and the outbreak of the Second World War, not much was done in the area of research into European agriculture. However, at the wish of Lusaka Wheat growers, the Northern Rhodesia government purchased a farm, 'Ferreira's Rust' in 1943 for use as an Agricultural Experiment Station.<sup>42</sup> The station was called Lusaka Wheat Station and was located east of Lusaka. It commenced experimental work in 1944. The primary objective of the station was to find the most suitable varieties of wheat for both the east and west edges of the railway line. Emphasis was also laid on disease survey and soil sample analyses. Seed trials and green manure trials were also conducted at the station.

Being set up at the height of the Second World War, the station faced a number of problems. During the remaining war years, the Department of Agriculture was grossly understaffed. Due to the non-availability of specialist officers, that is, a soil chemist, a plant breeder, an entomologist, a mycologist, no fundamental research work could be undertaken.<sup>43</sup> To make matters worse, the station was located in a rust area.<sup>44</sup> This was an inconvenient area for wheat growing. The area was not adapted for the growing of the rust-susceptible wheat varieties that were the most profitable wheat varieties west of the railway line.<sup>45</sup>

To contain this situation, arrangements had to be made for the multiplication of such varieties to be done on private farms. However, despite the problems the station

faced, by 1946, wheat production was well maintained and was expected to reach, if not exceed, the record of 25,000 bags established in the previous year.<sup>46</sup>

After the war, tobacco had turned out to be unexpectedly a prosperous crop. As a result of the rising number of tobacco farmers in the southern part of the country, the Northern Rhodesian Government was prompted to open the Mochipapa Tobacco Station in Choma in 1948. It was set up primarily to carry out trials in connection with the cultivation and curing of both virginia and turkish tobaccos. Due to increased tobacco research, the quality of Northern Rhodesian tobacco improved to the admiration of many buyers. At an auction in Salisbury, an auctioneer went so far as to remark that, 'of all tobacco so far, the Northern Rhodesian is the best!'<sup>47</sup>

Having discussed the activities of the research stations that were opened in Northern Rhodesia, we should now examine the techniques used by the Department of Agriculture in reaching out to the farming community. By definition, useful agricultural research is research whose findings always reach the intended targets, namely, the farmers. Anthony and Uchendu, agricultural scientists with long experience in Africa, agree with this function of agricultural research. They maintain that, 'continued agricultural change depends on the *flow* of information *from* the research *scientist* on new and rewarding techniques of farming [*to* the farmers].'<sup>48</sup> We, therefore, explore the different ways by which research findings were made to reach the farming community.

Extension work in Zambia is as old as research itself. Advisory services date back to the earliest days of research into agriculture. As early as 1915, occasional visits were being paid to farmers and advice was being given on agricultural matters.<sup>49</sup> The earliest agricultural communication activities concentrated on the production of publications for the small community of white farmers. Though they were effective means of transmitting

information, these (publications) early attempts did not yield good results. For instance at the first agricultural show in Mazabuka in 1917, 'farmers took not a single copy of the Department of Agriculture's experimental report.'<sup>50</sup> However, the most popular fora for demonstrating agricultural technology were through agricultural shows. At the first show in Mazabuka, it was noted that 'various crops, trees and fruit exhibits drew the attention of farmers.'<sup>51</sup> Subsequent shows proved to have had an impact on the farming community. By 1920, the use of good selected seed had become universal and many farmers had begun improving their lands by manuring them.<sup>52</sup> In the 1930s, agricultural shows became a common feature in the African areas. This was an imitation of what was going on in the settler farming areas.

Another popular way of disseminating agricultural research findings was through the African Improved Farming Scheme. This scheme was initiated in the 1946/1947 season. Under the scheme, African farmers were provided with an economic incentive to adopt change. A farmer who registered as an improved farmer was expected to contour his land and adopt fallows. He was further expected to adopt reasonable standards of cultivation and weed control. Occasionally, the improved farmers received visits from officials of the Department of Agriculture. If their maize was good, a bonus would be given to them. These improved farmer bonuses proved to be effective ways of enticing natives into adopting new methods of farming and agricultural technology worked out at the agricultural research stations. In 1949, it was reported that £4,200 was paid in bounty to the men of Kanchomba, Monze and Magoye areas who had been certified as improved farmers.<sup>53</sup> By 1950, there were 450 improved farmers in the Southern Province alone.<sup>54</sup>

Demonstrations were also an important aspect of extension work. The Northern Rhodesian government began recruiting Africans who would then be given practical

lessons in improved agricultural practices. These trained demonstrators would then pass on their newly acquired skills to their villages upon returning. At the Kanchomba Station, demonstrations were very important. Here, Africans were taught how to use manure and compost. They were further shown how to rotate their crops. In 1944, a small booklet was provided in English explaining this farming system which became known as the 'Kanchomba System.'<sup>55</sup> This was subsequently translated into Tonga, the local language. The Kanchomba System was, however, received with mixed feelings. The farmers who were paid for their co-operation, Uchendu and Anthony note, 'were looked upon by their neighbours as paid employees of the government.'<sup>56</sup> Indeed, many demonstrators regarded themselves in the same light and as Uchendu and Anthony further note, 'although some impact was made, it was not great.'<sup>57</sup>

In the 1940s, radio broadcasting was introduced as a way of disseminating information to farmers. Through the work of the Research Branch, by 1949, 29 broadcast talks per annum were being aired by research staff.<sup>58</sup> In the same year, 13 articles were contributed to *Mutende*, a vernacular Newspaper.<sup>59</sup> The purpose of this Newspaper was to enlighten the few Africans who could read.

### **Achievements And Failures Of Early Agricultural Researches**

In the first part of this chapter, we examined the successes and failures of the different agricultural research stations that were set up in Northern Rhodesia before 1950. These were discussed under each respective research station. At this point, however, discussion will focus on the general successes and failures that applied to almost all the research stations.

Agricultural research in the country was basically experimental in nature. It was not fully-fledged agricultural research as was the case in Southern Rhodesia.

Cumulatively, by 1950, agricultural research in Northern Rhodesia recorded more failures than successes, more so in African agriculture. There was little success in European agriculture particularly in entomology. Many notorious pests were identified, and where possible eradicated through the use of appropriate pesticides. Because of extension work, many European farmers began to pay more and more attention to selecting good quality seeds. The few farmers who put into practice positive results of the research findings greatly improved their crop yields.

A few notable successes were also recorded in the research into African agriculture. In the Southern Province for instance, after initial suspicions, many Africans decided to join the African Improved Farming Scheme. Chondoka noted that by 1950, 'even those who did not register as improved farmers started to increase their use of modern technology and more efficient methods such as crop rotation.'<sup>60</sup>

In the Eastern Province, as a result of adopting new agricultural practices, some Africans began engaging themselves in agricultural entrepreneurship. In 1949, for instance, a group of African cotton growers at Fort Jameson formed a cooperative society. Eventually their returns even enabled them to lease a small power plant from the Northern Rhodesian government. Production was so high that they later began to market lint cotton.<sup>61</sup> The success story of research into African agriculture was acknowledged by Sir Gilbert Rennie, the Governor of Northern Rhodesia in 1949. He stated :

I congratulate African farmers on the splendid results of the 1948 harvest. I hope that this good work will be maintained for the 1949 crop and that more and more attention will be paid to improved methods of farming.<sup>62</sup>

Certainly, research into agriculture led to some improvement in agricultural standards although the process was extremely slow. Prosperity in agricultural research was constrained by a number of factors. In consequence, before 1950, the impact of research

on agricultural development was not enormous. A major bottleneck to agricultural research was the economic slump of the 1930s. The slump had sent shock waves to the Northern Rhodesian farming community. Severe cutbacks in public expenditure led to a reduction of manpower in all sectors of the economy. The Department of Agriculture was not spared. Out of an establishment of 23 in June 1932, only 5 were left by 31<sup>st</sup> December, 1933.<sup>63</sup> At Mazabuka Central Research Station, the chemist was retrenched. His retrenchment marked the beginning of the end of agricultural investigations. Hulcrow lamented that, 'the retrenchment of the chemist was a serious setback for which the Agricultural Department has paid a very severe price.'<sup>64</sup> Without laboratory assistance, progress of field experiments were not only slow but also unsatisfactory. The mass retrenchment of agricultural staff resulted into the almost complete disappearance of research workers until the early 1950s.

The First and Second World Wars were the other major constraints to agricultural research. The wars had frustrated many plans and further led to the modification of existing programmes. Because of the Second World War, Dodge noted, 'agricultural development was severely constrained by the pitifully small funds allotted for agriculture or any other development.'<sup>65</sup> Progress in agricultural research during the war years was, therefore, minimal.

A perpetual problem at some stations was that of vermin attacks. Marauding animals, in most instances took a heavy toll on crops. At some stations, research work was greatly hindered by garden raiding animals. Travelling through Fort Jameson in 1930, Bush, the District Agricultural Officer lamented that :

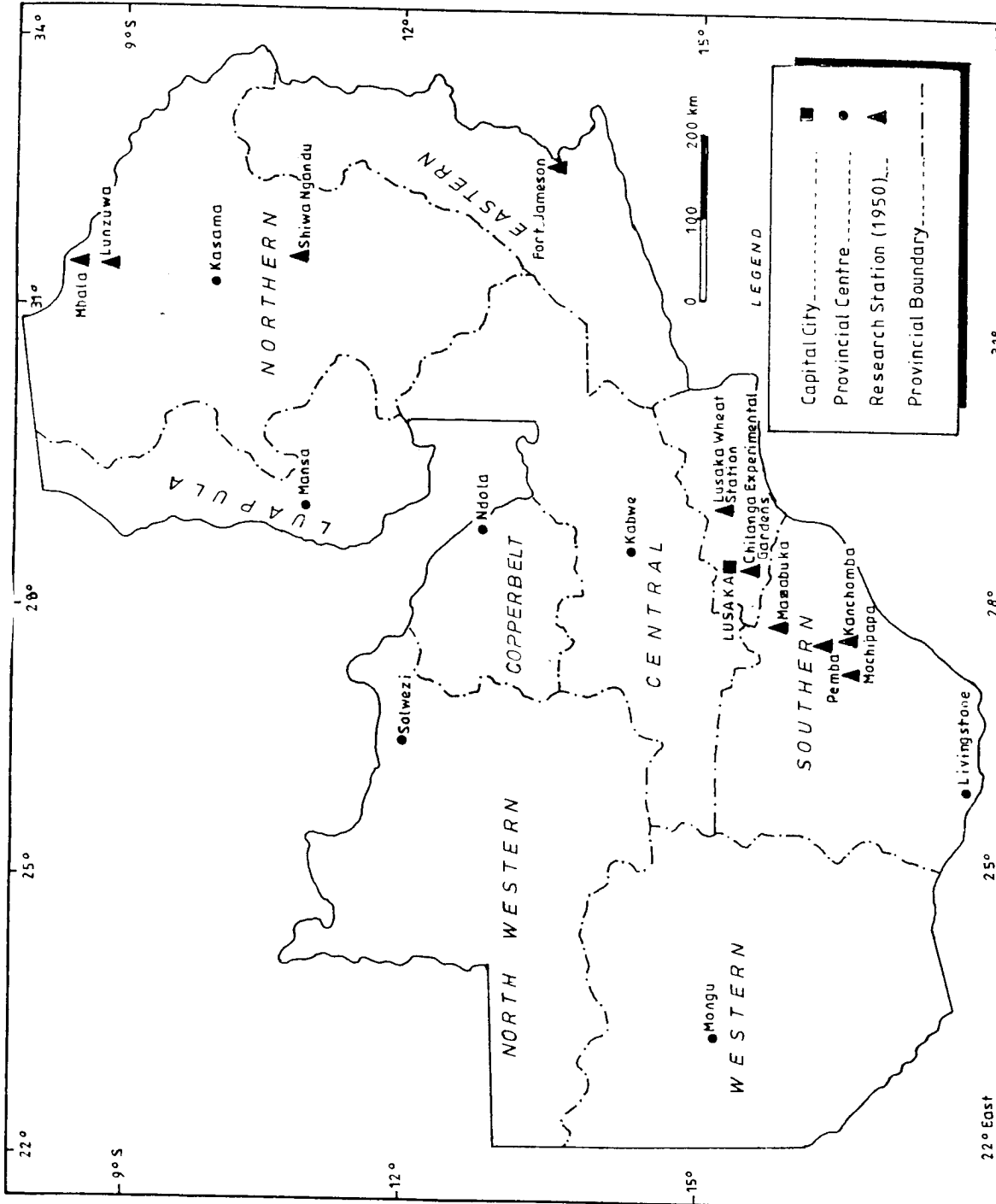
Complaints still come frequently about the damage caused by garden raiding elephants...stories told me of the amount of damage suffered on certain occasions are, I do not doubt, gross exaggerations, but in the aggregate each year, it cannot be negligible and must not be ignored.<sup>66</sup>

These problems stood in the way of agricultural research. It was not until 1950, with the inception of the Mount Makulu Central Research Station and subsequently, its substations that better results began to be obtained in agricultural research.

## **Conclusion**

This chapter has shown that efforts at raising the standard of agriculture in Zambia through research into agriculture date back to the early years of colonial rule. It has been observed that although before 1950, agricultural research was not formalised, experiments were conducted at the different experimental stations that sprang up in areas that settler farmers occupied (See Map 2 for experimental stations set up before 1950). We have further noted that despite the non-availability of proper research tools prior to 1950, agricultural experimentation was producing satisfactory results. The chapter has also shown that as a result of the many constraints to research, prosperity in agriculture was minimal. Certainly, by 1950, not much had been done by way of serious agricultural research work. There was an urgent need for specialist staff to solve the major agricultural problems facing the territory. With the establishment of a fully-fledged research station, perhaps these problems were going to be seriously addressed.

MAP 2: RESEARCH STATIONS SET UP PRIOR TO 1950



## ENDNOTES

- 1 Robert H Bates, *Rural Responses to Industrialisation* (London: Yale University Press, 1976), p. 17.
- 2 J. A. Bancroft, *Mining in Northern Rhodesia* (Bedford: Sidney Press, 1961), p. 52.
- 3 Jadwiga Lukanty and Adrian Paul Wood, 'Agricultural Policy in the Colonial Period', in Adrian P. Wood, Stuart A. Kean, John T. Milimo and Dennis M. Warren (eds), *The Dynamics of Agricultural Policy and Reform in Zambia* (Iowa: Iowa University Press, 1990), p. 5.
- 4 Samuel N. Chipungu, 'African Production in Mazabuka District: The Development of Surbodination', *Zambian Land and Labour Studies* 4, (1981), 19.
- 5 Marilyn Y. Jones, 'The Politics of White Agrarian Settlement in Northern Rhodesia 1898 – 1928', M. A. dissertation, University of Sussex, 1974, p. 12.
- 6 Jones, 'The Politics of White Agrarian Settlement in Northern Rhodesia', p. 45.
- 7 National Archives of Zambia (N.A.Z) Box 13, Department of Agriculture, *Annual Report, 1913*.
- 8 N. A. Z., Box 13, Department of Agriculture, *Annual Report, 1915*.
- 9 N. A. Z, Box 13, Department of Agriculture, *Annual Report, 1916*.
- 10 N. A. Z., Box 13, Department of Agriculture, *Annual Report, 1919*.
- 11 N.A.Z., Box 26, Magnus Hulcrow, *The Story of Agricultural Research in Northern Rhodesia*, 1955.
- 12 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1915*.
- 13 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1913*.
- 14 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1916*.
- 15 Bonard L. Mwape, 'Zambia's Agricultural Policy and Performance 1960-1980', Ph.D. Thesis, University of Pittsburg, 1984, p. 41.
- 16 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1920*.
- 17 Bates, *Rural Responses to Industrialization*, p. 20.
- 18 Yizenge A.Chondoka, 'Government Technical Assistance to African farmers in Mazabuka District, 1924-1954', *Zambian Land and Labour Studies* 4 (1981), 33.
- 19 Samuel N. Chipungu, *The State, Technology and Peasant Differentiation in Zambia: A Case Study of the Southern Province, 1930-1986* (Lusaka: Historical Association of Zambia, 1988), p. 25.
- 20 Cited in Jones, 'The Politics of White Agrarian Settlement', p. 78.
- 21 S.M. Makings, *Agricultural Change in Northern Rhodesia, 1945-65* (Los Angeles: Food Research Institute, 1966), p. 29.
- 22 Department of Agriculture, *Annual Report, 1929*, p. 8.

- 
- 23 Department of Agriculture, *Annual Report, 1929*, p. 9.
- 24 N.A.Z., Box 26, Hulcrow, *The Story of Agricultural Research in Northern Rhodesia*.
- 25 A. Pim, *Report of the Commission Appointed to Enquire into the Financial and Economic Position of Northern Rhodesia* (hereafter The Pim Report) (London: His Majesty's Stationery Office, 1938), p. 235.
- 26 *The Pim Report*, p. 214
- 27 Department of Agriculture, *Annual Report, 1935*.
- 28 *The Pim Report*, p. 214.
- 29 Mcheleka C. Nkhata, 'Settlement Schemes and Labour Migration in Chipata District of Eastern Province of Zambia', M.A. Dissertation, University of Zambia, 1987, p. 11.
- 30 N.A.Z., MAG. 2/8/1. From Acting Secretary of Agriculture to Honourable Chief Secretary, Livingstone, November 28, 1929.
- 31 N.A.Z., MAG. 2/8/1. From Provincial Commissioner, Fort Jameson to Honourable Secretary for Agriculture, October 5, 1929.
- 32 N.A.Z., MAG. 2/8/1. From C.J. Lewin to Agricola, Fort Jameson, 17<sup>th</sup> August 1943.
- 33 A.M. Kanduzi, 'Underdevelopment in Northern Rhodesia, 1918-1960: A Study of Customs Tariff and Railway Freight Policies', Ph.D. Thesis, University of Dalhousie, 1982, p. 59.
- 34 N.A.Z., KTN 1/1. *Abercorn District Notebook*.
- 35 The effectiveness of the *Chitemene* practice has been alluded to by a number of scholars. Read, for example, Audrey Richards, *Land, Labour and Diet in Northern Rhodesia* (London: Oxford University Press, 1939), especially pages 288 to 300; N.A.Z., Ministry of Agriculture, 2/8/4. Experiments: Abercorn, and N.A.Z., Ministry of Agriculture, 2/8/3. Experiments: Shiwang'andu.
- 36 Bennet S. Siamwiza, 'Hunger in the Gwembe Valley: A Case Study of Mweemba Chieftaincy, 1905-1987', M.A. Dissertation, University of Zambia, 1993, p. 59.
- 37 N.A.Z., MAG. 2/8/4. From District Agricultural Officer, Abercorn to Director of Agriculture, 2<sup>nd</sup> July 1940.
- 38 N.A.Z., MAG. 2/8/3. Experiments: Shiwang'andu, 1937 to 1940.
- 39 N.A.Z., KSB 3/1. *Mazabuka District Notebook: Tour Report Number 4*, 1951.
- 40 N.A.Z., MAG. 2/5/11. *Eastern Province Annual Report, 1941*.
- 41 N.A.Z., KBS 3/7. *Mazabuka District Notebook*.
- 42 N.A.Z., MAG. 2/17/29. From Chief Secretary to Commissioner for Lands, Mines and Surveys, October 26, 1943.
- 43 Northern Rhodesia Government (hereafter NRG). *Report of the Committee Appointed to Inquire into the Development of the European Farming Industry, 1946*. P. 11.

- 
- 44 Rust is plant disease. It leaves coloured spots on plants. For more details, read N.A.Z., Ministry of Agriculture, 2/17/29: Lusaka Wheat Station.
- 45 NRG, *Report of Committee Appointed to Inquire into the Development of the European Farming Industry*, p. 12.
- 46 N.A.Z., MAG. 2/5/12. Notes for His Excellency's Address, November 11, 1946.
- 47 'Northern Rhodesian Tobacco Gets Good Prices', *Mutende*, 26<sup>th</sup> May 1949, p. 7.
- 48 Kenneth M. Anthony and Victor C. Uchendu, *Agricultural Change in Mazabuka District, Zambia* (Los Angeles: Food Research Institute, 1970), p. 232.
- 49 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1915*.
- 50 Cited in E. Peter, R. Watts, Peter Ngangula and A. W. Haas, 'Agricultural Communications', in Adrian Wood et al (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*, p. 356.
- 51 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1918*.
- 52 N.A.Z., Box 13, Department of Agriculture, *Annual Report, 1920*.
- 53 'Great Success of African Improved Farmers', *Mutende*, 26<sup>th</sup> September, 1949, p. 8.
- 54 Anthony and Uchendu, *Agricultural Change in Mazabuka District*, p. 227.
- 55 N.A.Z., Box 6, C.E. Johnson, 'African Farming Improvement in the Plateau Tonga Maize Areas of Northern Rhodesia', *Agricultural Bulletin* 11, p. 4.
- 56 Anthony and Uchendu, *Agricultural Change in Mazabuka District*, p. 237.
- 57 Cited in Anthony and Uchendu, *Agricultural Change in Mazabuka District*, p. 237.
- 58 E. Peter et al, 'Agricultural Communications', p. 356.
- 59 Department of Agriculture, *Productive Farming*, 127 (1984), 11.
- 60 Chondoka, Government Technical Assistance to African Farmers in Mazabuka District', p. 42.
- 61 'Cotton Growing in Northern Rhodesia', *Mutende*, 21<sup>st</sup> February 1950, p. 12.
- 62 Sir Gilbert Rennie, 'His Excellency's Christmas Message to Africans-Hopes for the New Year', *Mutende*, 6<sup>th</sup> January 1949, p. 1.
- 63 *The Pim Report*, p. 232.
- 64 N.A.Z., Box 26, Hulcrow, *The Story of Agricultural Research in Northern Rhodesia*.
- 65 Doris J. Dodge, *Agricultural Policy and Performance in Zambia* (Los Angeles: University of California, 1977), p. 17.
- 66 N.A.Z., MAG. EP4/2/2. *Quarterly Report for Fort Jameson District, 1930*.

## CHAPTER THREE

### THE DEVELOPMENT OF MOUNT MAKULU CENTRAL RESEARCH STATION AND ITS AFFILIATE STATIONS

The present chapter focuses on the growth of the Central Research Station and its affiliate stations that were established in the period beginning from 1958. We examine the agricultural research work conducted at the Central Research Station and the affiliate stations. The main argument is that during the colonial period, from 1950 to 1963, and the independence era from, 1964 to 1980, the British colonial administrators and the Zambian Government respectively supported agricultural research at the station. By the end of this period, support from the two governments paid dividends. The research station quickly found tangible solutions to many critical agricultural problems facing the Ministry of Agriculture in the country.

The chapter is divided into two sections. The first section examines the growth of agricultural research from 1950 to 1963. The second section discusses research work in independent Zambia from 1964 to 1980.

#### **Agricultural Research Work, 1950-1963**

At its inception, the Central Research Station had six specialists, each one heading a section at the institution.<sup>1</sup> The station had the following sections: Soil survey, Plant pathology, Pasture research, Plant breeding, Chemistry and Agronomy.<sup>2</sup> The Soil Chemist was endowed with the task of undertaking laboratory work and fertiliser trials while the Soil Scientist (Surveyor) was given the task of doing pedology, investigating the possibility of utilizing “dambo” soils, the soils of the Kafue Flats and Bangweulu Basin, and the soil problem of “Chitemene agriculture”. A Plant Breeder was to do the breeding and selection of sorghums, groundnuts and wheat. If it were to be found that the

territory should embark on breeding hybrid maize, one more Plant Breeder was to be recruited. An Entomologist/Plant Pathologist was to work on the most common pests and diseases in the territory. He was also to advise officers of the Department on control measures. The Pasture Research Officer was to research on pastures, both irrigated and dry land. The Agronomist was given the task of undertaking field trials.

The infant station did a substantial amount of research work in the early years of its existence. The Soil survey section was responsible for soil and vegetation surveys leading to the preparation of land use maps. Aerial photographs were utilised by the section. By 1953, many soil samples had been taken from the main soil types and analysed in the laboratory on the Copperbelt which subsequently showed that the soil colour can be used as an indicator of agricultural worth.<sup>3</sup> By 1957, the soils of agricultural stations had been investigated in detail and a good start made towards the compilation of a Soils Map of the territory.

Plant breeding did not commence until 1954 due to the absence of a Plant breeder at the station. In plant breeding, emphasis was on wheat, groundnuts and indigenous food crops. Elijah Mudenda, who was the first African Plant breeder at the station alluded to the importance of wheat breeding in his section. He stated that ‘wheat breeding and selection were critical in the Plant breeding section. Bread was being consumed a lot. Therefore, there was need to produce wheat that would in turn produce flour of high quality.’<sup>4</sup> Maize breeding also commenced in 1954. However, in the early years, breeding of maize was not systematic as no clear objectives were defined.<sup>5</sup>

The Plant pathology section had initially laid emphasis on assessing the relative importance of the numerous plant disease problems in the territory. It was felt at that time that the crops warranting most attention were tobacco, rice and groundnuts.<sup>6</sup> Many

samples were diagnosed for disease. By 1954, 344 specimens had been received by the Plant Pathologist for diagnosis.<sup>7</sup>

In the Soil chemistry section, focus was on undertaking fertilizer trials on maize, tobacco and groundnuts. The section sought to find answers to the problems of fertilising crops on the main soil types. By 1953, hundreds of farmers' soils had been examined so as to make fertiliser recommendations. In 1954, over 500 soil analyses were carried out at the station.<sup>8</sup> This number increased to 2000 in 1956.<sup>9</sup>

Agronomy was also a very important aspect of research work at the station. Its major components were field trials concerned with fertiliser dressings, crop rotations, cultivation trials and the use of herbicides. In the early years, focus was on the nitrogeous manuring of maize. This had become the standard recommendation by 1958.<sup>10</sup> Because of the successful nitrogeous trials, the Federal Government began anticipating building a factory in the Federation for the production of cheap nitrogeous fertilisers. By 1963, it had not built the fertiliser factory in the territory.

In the Pasture research section, considerable attention was paid to research into planted pastures and the management of natural grazing. This was carried out in co-operation with the Veterinary Department which had a Pasture Research Officer stationed at Mazabuka.

Despite its smooth path towards increased research into agriculture, there was a general feeling among officers in the Department of Agriculture that Northern Rhodesia still had a lot to do in terms of agricultural research work. It is for this reason that under the Development Plan of 1959 to 1963, agricultural research was given top priority by the government. The primary objective of the four year plan was the development of African agriculture. This was to be done through land use planning, the application of research

and the improvement of extension services to African farmers. Included in the plan was a clause alluding to the fact that research should be further boosted through the increase in the number of subsidiary research stations. This idea was born out of the realisation that Northern Rhodesia was too big to depend almost entirely on one station. This view was expressed by the Director of Agriculture in 1960. He stated :

The territory is so big and the ecological conditions so varied that we cannot hope to meet all investigations and requirements through the Central Research Station.<sup>11</sup>

It was this realisation that prompted the Secretary to the Ministry of African Agriculture to make an application to the Ministry of Finance for a total of 45,350 Pounds for the capital development of the Central Research Station and for two subsidiary research stations.<sup>12</sup> The need for these was seen to be greatest in the Eastern and Southern Provinces where the biggest agricultural advances had been made. In the Eastern Province, it was to be at Msekera and in the Southern Province at Magoye. These regional stations were to test the local application of research conducted at the Central Research Station. Experiments such as those concerned with optimum level of planting, fertiliser trials and rotation experiments had to be conducted within the environment in which they were going to be applied in order to provide results for local application. Regional stations were to further examine regional problems concerned with crop and animal husbandry. They were also to act as a local source of agricultural and agronomic knowledge for extension staff and farmers in the region. By 1963, regional stations had been set up at Misamfu in Northern Province, Magoye in Southern Province and Msekera in Eastern Province; Mpika and Uwin Moffat were opened as substations administered from Misamfu Regional Station.<sup>13</sup> However, Mochipapa Regional Station, which was part of the Four Year Development Plan was not established until 1964.

The effect of this reorganisation in the Research Branch was a more co-ordinated research programme. The station's staff were made responsible for trials held on both the Central Research Station and other trials held off the station within the respective province. Commenting on this re-organisation, Ballantyne, the Chief Research Officer at Mount Makulu in 1967 was proud to state :

Although this reduced the number of trials undertaken annually, it did increase the accuracy, usefulness and degree of success attained with critical field trials. As the spread of regional stations has increased, so is the volume of information increasing in areas at one time inaccessible.<sup>14</sup>

During this four-year period of re-organisation, marked successes were recorded by the various sections. By 1963, cotton was firmly on its feet in Southern Province and trials were being undertaken to simplify insect control. Many trials had also been conducted to ascertain the relationship between soil type, soil fertility and crop rotation. Many maize variety investigations had also been conducted. Research into groundnuts had focused greatly on investigations into the 'pops' problem.<sup>15</sup> Sorghum had been identified as a crop with a potential for brewers' malt and subsistence. In consequence, many trials were conducted to select high yielding sorghum strains. In pasture research, priority of staff time was devoted to an evaluation of the natural veld in the sand veld areas which carried 80% of the cattle population of Northern Rhodesia.<sup>16</sup> In the land use section, soil topographical maps and land classification maps had been worked on. Considerable progress was also made in plant breeding. It was during this period that the Makulu red, a high-yielding groundnut strain was developed.<sup>17</sup>

It was during the Four Year Development Plan that the Plant protection section was opened in 1962. Its major function was to develop and adopt appropriate pest control technologies and provide advisory and specialist services to stakeholders.<sup>18</sup> After the dissolution of the Federation, it also became responsible for the implementation of

phytosanitary regulations. To successfully implement phytosanitary regulations, the Phytosanitary section was set up as a wing of the Plant protection section. Its work was to ensure that imported plants or plant products were thoroughly inspected according to appropriate procedures.<sup>19</sup> It was also responsible for the issuing of the Phytosanitary Certificates and Plant Import permits.<sup>20</sup> To assist in regulatory duties, two Plant Health Inspectors were initially appointed, one at Livingstone and the other at the Central Research Station. Later, other Inspectors were stationed at Chirundu, Tunduma and Fort Jameson (Chipata). In 1965, Plant Inspectors began visiting Plant growers in order to assist them to grow good plants. By the end of the year, a total of 735 visits were made by Plant Inspectors in the country.<sup>21</sup>

Although the station was doing very well during the period of the Four Year Development Plan, it had its own problems arising out of some of the Federal Government policies that were detrimental to the work of the Central Research Station. From 1953, Northern Rhodesia was under the Federal Government. Under this Government, European agriculture became a responsibility of the Federal Government whereas African agriculture was the responsibility of the territorial Government. During this period, agricultural research programmes were coordinated by the Federal Government. This was done through a Federal Research Advisory Committee of which the territorial Chief Research Officer was a member. This Federal arrangement was detrimental to research work. Many of the functions which the Central Research Station was previously undertaking were moved to the Federal Department of Research and Specialist Services. At the same time, the local commercial European farmers whose experience and ideas should have played a big role in research programmes also moved to the Federal government. Staffing was another problem for the Station. Comparing it

with British colonies such as Kenya and Malawi, the Station had fewer staff in the fields of Agricultural Extension and Research, an indication of low priority by the British government in this area. There was also an imbalance in research staff. Whereas the country, for instance, had enough Plant breeders, during this period, there was no Entomologist. The first full time Entomologist was only appointed after independence in 1965.<sup>22</sup> Because of this imbalance in research staff, the available staff did what they could, not necessarily what needed to be done. The problem of staff shortage became compounded following political developments which ended the Federal Government system. On December 31, 1963, the Central African Federation was dissolved and on October 24, 1964, Zambia became independent. The next section seeks to analyse the impact of the dissolution of the Central African Federation on agricultural research and subsequently the position of agricultural research in independent Zambia.

### **Research Work at the Station, 1964-1980**

The break-up of the Central African Federation had some negative consequences on agricultural research in the country and Mount Makulu Central Research Station in particular. For instance, the dissolution of the Federation affected the supply of hybrid maize seed. All but three growers of the hybrid maize seed for the Maize Seed Producers' Association lived in Southern Rhodesia (Zimbabwe). Therefore, Zambia was left without the inbred material necessary for producing the three common hybrids SR52, SR13 and SR11.<sup>23</sup> It was not until negotiations were made that a small quantity of the inbred plants was made available to the Plant breeding section at the Central Research Station. These inbred plants improved the production of hybrid seed in the country.

The newly formed Zambian government put high priority on agricultural research in order to improve agricultural production in the country. It was also a way of reducing

heavy dependence on the mining industry in the country. The importance of agricultural research in the country was made clear in 1964 by the first Minister of Agriculture, Elijah Mudenda, an agronomist by profession when he pointed out that :

Today, there are two agricultures (sic) in Zambia, small-scale undercapitalized subsistence producer and the large commercial farmer. Progress is being made in breaking down the dividing line. Many farmers are still ignorant of modern techniques and lack the wherewithal to improve their methods ... no doubt research will show the way to sound economic production.<sup>24</sup>

Indeed, in 1964 much research work was done at the Station and marked successes were recorded in various research areas. In groundnut research, the success of the Eastern Province Confectionery whose groundnuts competed favourably on the world market resulted in further research to improve the off-take of groundnuts. In the same year, an embryo section was set up at the Station to provide a Seeds section which was, in the past, the responsibility of the Federal Government. The year 1964 also saw the introduction of routine milk testing in the Chemistry section. That was an important development and tremendous booster to dairy farmers and investors in milk who aimed at producing on a large scale for the increasing population in Lusaka.

After independence, government policies towards agriculture were dominated by the need for increased production in the small-scale sector so as to raise the standard of living of the people in rural areas. The desire to raise the status of the rural farmer was aptly demonstrated by the setting up of the Food Conservation and Storage Unit at Mount Makulu Central Research Station. The Unit provided useful all-year data analysis, through surveys, of the losses due to pests on stored maize under village conditions. Several traditional designs of maize stores were tested in order to reduce insect entry and therefore storage loss. The use of local materials in building the maize stores in the Unit was directed at solving the problems of storage facing the small-scale farmer. Mr.

Siameja, our informant summarised the philosophy behind this programme when he concluded that, 'the whole programme was for the traditional or small-scale farmers because the commercial farmers could at that time and can still afford more advanced technology to day.'<sup>25</sup>

Apart from research done at the Station itself, many other researches were conducted at Substations and Regional Research Stations in the country. In 1964, five more Regional Stations were opened. These were Copperbelt Regional Station at Mufulira, Broken Hill (Kabwe) Station, Mochipapa Research Station at Choma, the National Irrigation Research Station at Mazabuka and Mazabuka Animal Husbandry Research Station. Subsequently, a wide range of trials were conducted through these Regional Stations (See Table I).

TABLE I

## REGIONAL RESEARCH STATIONS AND THEIR WORK PROGRAMMES

Regional Research Station	Year Established	Area Covered	Work Programmes
Misamfu	1958	Northern Province	coffee, tea, maize, beans and groundnuts
Magoye	1958	Southern Province	maize, cotton, groundnuts, tobacco, beans, sorghum, basic soil fertilising, farm management and farm machinery
Msekera	1962	Eastern Province	maize, groundnuts, cotton, tobacco, soyabeans, beans and sorghum
Mazabuka Animal Husbandry	1964	All Zambia	Animal husbandry research
National Irrigation	1964	All Zambia	Irrigation crops and pastures
Copperbelt	1964	N.W. Province Copperbelt Province	Tree crops, vegetables, beans, maize and groundnuts
Kabwe	1964	Central Province	maize, tobacco, beans, and cotton
Mochipapa	1964	Southern Province	tobacco, maize, groundnuts, legumes, grasses, cattle and cotton
Mansa	1967	Luapula Province	Groundnuts, cassava, sweet potatoes, maize, rice and beans
Mwinilunga	1971	N.W. Province	maize, soyabeans, groundnuts, oil palms, pineapples, cassava and pasture research
Mongu	1973	Western Province	cassava, maize, sorghum, soyabeans, groundnuts, animal husbandry, horticulture and pasture research

SOURCE: Compiled from NAZ MAG. 2/8/27, "Research Branch: Its structure and Functioning", NAZ MAG. 2/8/27. From Chief Research Officer to Director of Agriculture: 5<sup>th</sup> October, 1967, Annual Reports of the Research Branch 1964-1980 and Annual Reports of all Regional Research Stations, 1958-1973.

The framework for agricultural research was quickly set up in 1965 and put in the First National Development Plan which ran from 1966 to 1970. The plan emphasised that research had by 1965 provided answers to the many problems that had initially faced agriculture in Zambia.<sup>26</sup> To complete the establishment of a fully independent research organisation in the country, a fairly large programme to expand the Central Research Station and its Regional Stations was included in the Plan. A lot of emphasis was put on the problem of “pops” in groundnuts and on continued research into animal husbandry. The Central Province had a large share of the Plan’s resources, both because of its high potential and more importantly because it housed many of the Central Research Station’s infrastructure required for the expansion of both the agricultural industry and research.<sup>27</sup> Priority was on research into production of cash crops suitable to the environment, especially, virginia tobacco.

Certainly, the period from 1966, was a period of many important activities in terms of agricultural research work. By 1970, Regional Stations had increased to eight, while Substations had been increased to four by the end of the same year.<sup>28</sup> More than half of the professional and technical staff of the Research Branch in the Ministry of Agriculture was sent to the Regional Stations and the other half was sent to the Central Research Station.

In an effort to tackle the “pops” problem in groundnuts, a large number of experiments were carried out in the high rainfall regions where the “pops” occurrence was widespread. The aim of these experiments was to find some solution to the problem. Experiments conducted before 1965 had met with little success. However, subsequent experiments conducted in 1966 and 1967 in Northern and North-Western Provinces

concluded that “pops” was associated with basic crop nutrients; the most important being calcium.<sup>29</sup> This was a major breakthrough in the groundnut research.

The period from 1966 saw an intensification of research into animal husbandry. It was felt that with an increasing consumption of meat, it was imperative that serious attention be given to applied animal husbandry research with a bias on the indigenous beef breeds. At Mazabuka Regional Station, animal husbandry research to produce more beef began in October, 1964. By 1968, more than 2,000 beef bulls, 800 cows and heifers, and 260 steers had been evaluated for beef potential.<sup>30</sup> All beef bull surpluses to research requirements were distributed to government ranches and to cattle farmers. By 1967, the research into cash crop production had also yielded good results. At Kabwe Regional Research Station, the main centre for tobacco research in the country, results of fertilizer trials on virginia tobacco were promising. Maize, being a relatively easy crop to grow and being a crop that could be used to move the subsistence farmer into the cash economy had also been given a lot of attention. The year 1967 was the first full year of production of Zambian certified maize seed, SR52. In this year, for the first time, Zambia became self sufficient in hybrid maize seed, with the production by the Producers’ Association of about 33,000 pockets of maize seed.<sup>31</sup>

With independence came the beginning of new sections both at the Central Research Station and at Regional stations. Research into farming systems commenced at Magoye Regional Station in 1966 with the opening of the Farm Management section. Its focus was on the growing number of small-scale farmers who were making their transition from subsistence to commercial farming. The section collected information on the economics of the farming systems practiced on small farms. The aim was to develop profitable farming systems applicable to small farms by using the resources available to

the farmer. The section carefully evaluated its work using the farm under the Experimental unit at the station. By 1969, it was reported that results were promising and had shown that under good management, a satisfactory income could be achieved on this type of farm.<sup>32</sup>

In 1967, the Biometrics section was opened at the Central Research Station. The opening of this section was prompted by the growing number of statistical work needing analysis. Before the dissolution of the Central African Federation, statistical work was carried out by the Biometrics unit in Salisbury (Harare). After that, officers either carried out their own analyses or did the analyses at the Central Research Station using computer programmes with the help of successive crop breeders.<sup>33</sup> Results of complex trials were sent for analysis to Rothamsted Experimental Station in the United Kingdom which had better equipment and liaised with the Central Research Station. The section basically assisted in the design and analyses of experiments in the Research Branch of the Ministry of Agriculture. It also advised on the interpretation of results both for internal and external publication.

Researchers at the Central Research Station quickly responded to the new government's call for an increase in research by adopting new technologies. This was vividly demonstrated by the Plant Protection section. It had long been realised that the excessive use of chemicals for pest control on a variety of agricultural and horticultural crops had some negative effects. This chemical control of pests sometimes resulted in abnormal population increases of other pests than target pests. Therefore, in 1968, the Plant Protection section initiated the biological control of pests. 'Biological control is the suppression of pest population by its natural enemies'.<sup>34</sup> The natural enemies of the pests are mass-reared and released in the infested areas. The beneficial organism attacks the

pest and therefore halts its spread. The advantages of this method of pest control is that it is cheap, self sustaining and specific.<sup>35</sup> By 1969, bio-control agents had been successfully used in the control of potato tuber pests and the Lantana weed.<sup>36</sup>

In January, 1972, the Farm Machinery Research Unit was set up as a Section of the Central Research Station. Its work was to test and develop equipment for the small scale farmer. Such equipment included hand tools, ox-drawn equipment and simple engine powered equipment. In 1972, a wide range of such equipment was tested for suitability in the field.<sup>37</sup>

Certainly, the period of the First National Development Plan was one of remarkable successes in agricultural research. As noted, many developments had taken place at the Central Research Station and at Regional stations. A contributing factor to this prosperity in agricultural research and in some other sectors of the economy, the then President of Zambia, Kenneth Kaunda noted, was the fortuitous price of copper during this period.<sup>38</sup> Zambia's achievements in agricultural research gave policy makers the impetus to further consolidate research into agriculture. Subsequently, the Second National Development Plan which ran from 1972 to 1976 placed agricultural research as a priority. It emphasised and encouraged the production of protein foods, protective foods, oilseeds and tobacco.<sup>39</sup> This was done through increased research to attain self sufficiency in basic foodstuffs and high value foods.

In 1972, research into fruit trees was initiated at Mufulira Regional Station and at the Central Research Station. Research into fruit trees was necessitated by the growing importance of fruits. They were increasingly being used in the manufacturing industry for jams, canned fruit and wines.<sup>40</sup> Sesheke substation and the National Irrigation Research Station also became centres for fruit tree research. Experimental work was

begun in deciduous fruit trees such as peaches, apricots and plums. By 1974, varietal work on indigenous fruit trees like mangoes, paw-paws and avocados had also commenced.

In 1978, research into vegetables was initiated at the National Irrigation Research Station. Vegetable research was introduced because of the important role vegetables play in positive health, supporting vitamins and their medicinal properties.<sup>41</sup> The job description of the vegetable research team entailed selecting vegetable cultivars that would adapt to dry and wet conditions and would resist pests and diseases. Right from the inception of the vegetable research in the country, cultivars of important vegetables were aptly screened on a continuous basis in three seasons, namely, rainy, summer and winter. This resulted into the selection of promising cultivars adapted for each season.

Despite achieving notable successes, some bottlenecks greatly hindered the work of the Central Research Station in the 1970s. Impurities from Chilanga Cement factory posed serious problems for scientists when conducting experiments in the fields at the Station. In 1977, the Deputy Director of Research announced that air pollution caused by fumes from the Chilanga Cement factory was hampering research at the Station.<sup>42</sup> Lime particulates from the factory led to an increase in the alkaline content in the soils at the Station. This made the alkaline levels in the soils much more than those found in other parts of the country.<sup>43</sup> In consequence, in 1980, soil experiments were moved to Golden Valley Agricultural Research Trust farm (GART), eighty kilometres north of Lusaka on the Lusaka-Kabwe Road. This farm had been detached from the Projects Division of the Ministry of Agriculture in order to turn it into the National Cereals Research Station.<sup>44</sup> Another problem faced by the Central Research Station was a shortage of qualified personnel mainly due to low remuneration for scientists.<sup>45</sup> The low salaries prompted

many scientists to leave the Station. In Pasture research, for instance, there had never been a full establishment of Pasture Research Officers by 1980. Crunfurd, a Plant Breeder lamented :

The programmes were carried to a convenient stage and then stopped, usually because the officer left the country and no replacement was recruited. Lack of follow 'ups' to their researches greatly diminished the value of their work . . . only short term trials were given an answer quickly.<sup>46</sup>

This staffing problem adversely affected the work at the Station.

In the 1970s, the Research Branch became the recipient of an increasing amount of donor aid. This was due to the fact that the financial allocation in the national budget for the Ministry of Agriculture was declining annually as a result of an equally declining national economy due to poor performance of copper, the country's main foreign exchange earner, on the world market. For instance, in 1973, there was a quadrupling of international oil prices, and in the following year there was a sharp downturn in the world prices of copper.<sup>47</sup> An immediate consequence for the Research Branch was the slowing down of experimentation due to the shortage of funds to buy adequate amounts of chemicals. One former worker of the Central Research Station recalled that, '...previously, chemicals had always been available. They would be supplied for a year. The problems of the 1970s led, for the first time, to all stocks being used up. It was only the sections receiving donor aid that were performing well.'<sup>48</sup> In the Soil survey section, external aid began coming in as early as 1973. The Norwegian Development Agency (NORAD) began assisting in conducting soil surveys in the country. By 1974, a large number of field and laboratory determinations had been done, both at the Central Research Station and at Regional stations.<sup>49</sup> In the same year, the Food and Agricultural Organisation (FAO) provided staff under the African Rural Storage programme to

develop and introduce improved structures for grain storage.<sup>50</sup> In the wheat research, donor aid began coming in the 1977-1978 season. With the assistance of the FAO, Canadian aid and Belgian aid, a major endeavor in rain-fed wheat was initiated in Lusaka and Mbala.<sup>51</sup> During the same season, with the assistance of FAO, a project to assess and develop improved maize varieties with resistance to disease commenced. By 1980, the Swedish International Development Agency (SIDA) had begun funding maize breeding as part of its Agricultural Sector Support Program (ASSIP) for Zambia.<sup>52</sup>

It was because of the numerous constraints to agricultural research work that in the Third National Development Plan, 1979 to 1983, agricultural research received exceptional support. The Plan also restructured the programmes for research in agriculture to cater for all levels of farmers to ensure optimum production of crops both by small and large-scale farmers.<sup>53</sup> Under the Third National Development Plan, a total of K9,045 was allotted for research.<sup>54</sup>

By 1980, the Third National Development Plan had begun to fructify. The small-scale farmer received visible attention in the 1979-1980 season through the establishment of the Tuber Research Team at Mansa Regional Station. For many years, research in tuber crops, mostly grown by the small-scale farmers, had been ignored. At long last, the government recognised the importance of tuber crops and released funds for the establishment of the research team. Emphasis was on research into cassava and sweet potatoes.<sup>55</sup>

Another major turning point in the history of the Central Research Station was the establishment of the Adaptive Research Planning Team (ARPT) as a section at the Station. The idea to start ARPT traces its roots to the 1970s. In the mid-1970s, there was a growing awareness among senior personnel in the Ministry of Agriculture and Water

Development that there were inadequacies in the functioning of the Research Branch. A major inadequacy identified was the apparent inability of the technology and transfer process to meet the needs of small-scale farmers in diverse environments. Ndiyoi and Phiri noted that, 'the government's "back to the land" philosophy meant small-scale farmers had to be brought into income generating activities involving agriculture'.<sup>56</sup> This could only be achieved by seriously addressing the research needs of the small-scale farmers.

In the course of evaluations of the Research Branch in the 1970s, four main weaknesses were identified in the functioning of the Research Branch.<sup>57</sup> Researchers, it was noted, had minimal contact with small-scale farmers but instead tended to pursue their own specialised interests. It was also observed that recommendations were being made for a province as a whole over-looking the fact that provinces had different farming systems. The tendency of conducting trials on research stations was perceived as producing inconclusive results as research station conditions were different from conditions on farmers' fields. In the light of these flaws in the functioning of the Research Branch, the Adaptive Research Planning Team was born in 1980. Its major task was to undertake adaptive research, especially on the farmers' fields. Recommendations relevant to the needs of Zambia's small-scale farmers would then be produced. Indeed, as Kean, Singogo and Sutherland noted, the Adaptive Research Planning Team helped put the farmers' identified needs clearly on the research agenda.<sup>58</sup> 1980 therefore, was a year of change for the small-scale farmers. After years of neglect, research efforts began to be directed at them.

Within a 30-year scope, the Central Research Station had grown considerably in size and strength. Regional stations had by 1980 risen to 11, each conducting researches

suited to the agro-ecological conditions of its locality. These stations were Magoye, Mochipapa, Mazabuka Animal Husbandry, National Irrigation, Kabwe, Msekera, Copperbelt, Mongu, Mwinilunga, Misamfu and Luapula Regional Research Stations (see Map 3). By 1980, a lot of research work had been conducted at the Central Station. Marked successes were recorded in the Station's researches into cotton, sorghum, groundnuts, maize, wheat and tea. There was also an improved use of the fertilisers, and the identification of different plant diseases. Many sample seeds had been tested at the Station following the passing of the Seeds Act in 1968.<sup>59</sup> Thereafter, there were safeguards against buying of inferior seeds. The Animal Husbandry research work at Mazabuka was so successful that a visiting world expert in cattle was, as early as 1968, able to describe the programme as, 'one of the finest in Africa!'<sup>60</sup> Many soil samples had been analysed and that led to the systematic evaluation of their potential fertility.

Over the years, there was an increase in staffing at the institution. This was an indication that the Station had grown both in size and in strength. At its official opening in 1955, the Station had 15 specialist officers and 3 supporting members of staff.<sup>61</sup> By 1965, staffing stood at 36.<sup>62</sup> In 1980, the Station had 121 members of staff.<sup>63</sup> The increase in accommodation at the Station was also a sign of growth. In 1956, for example, there were only 94 housing units.<sup>64</sup> In the 1970s, however, due to the increase in the volume of work at the Station and the increase in staffing, a large proportion of the Station's capital expenditure went to the improvement and increasing of staff accommodation. For instance, in the 1970-71 budget allocation, K140,000 was spent on building staff houses at the institution.<sup>65</sup>



## **Conclusion**

This chapter has argued that in the years 1950 to 1980, a lot of agricultural research work was done in Zambia. It has been noted that the inception of the Central Research Station altered the course of agricultural research in Zambia. The research institution, it has been noted, brought about co-ordinated research. It has also been noted that the path towards boosting agricultural production through co-ordinated research was not a smooth one. However, in spite of the numerous constraints to agricultural research work, marked successes were recorded at the Central Research Station and at Regional Stations and Substations that were established in different parts of the country. Certainly, by 1980, a lot of research had been conducted at the Central Research Station. In the next chapter we discuss the impact of agricultural research at Mount Makulu Central Research Station and its affiliate stations on agriculture in Zambia.

## ENDNOTES

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<sup>1</sup> N.A.Z., MAG. 2/8/8, 'Research Plans'.

<sup>2</sup> N.A.Z., MAG. 2/8/8, 'Research Plans'.

<sup>3</sup> Northern Rhodesia Government (hereafter known as NRG), *Colonial Research 1954-1955* (London: His Majesty's Stationery Office, 1955), p. 205.

<sup>4</sup> Interview with Mr. E.H.K. Mudenda, Lusaka, November 15, 1999.

<sup>5</sup> Interview with Mr. T. Manda, Mount Makulu Central Research Station, Chilanga, March 20, 2000.

<sup>6</sup> NRG, *Colonial Research 1953-1954* (London: His Majesty's Stationery Office, 1954), p. 182.

<sup>7</sup> NRG, Department of Agriculture, *Annual Report, 1954*, p. 23.

<sup>8</sup> NRG, Department of Agriculture, *Annual Report, 1954*, p. 7.

<sup>9</sup> NRG, Department of Agriculture, *Annual Report, 1956*, p. 12.

<sup>10</sup> NRG, Department of Agriculture, *Annual Report, 1958*, p. 13.

<sup>11</sup> N.A.Z., MAG. 2/4/5. From Acting Director of Agriculture to Finance Officer, 1<sup>st</sup> March, 1960.

<sup>12</sup> N.A.Z., MAG. 1/4/5. From Acting Secretary, Ministry of African Agriculture to the Secretary, Ministry of Finance, 18<sup>th</sup> June, 1960.

<sup>13</sup> N.A.Z., MAG. 2/8/27. Director of Agriculture, 'Notes on the Research Branch', 5<sup>th</sup> October, 1967.

<sup>14</sup> N.A.Z., MAG. 2/8/17. From Chief Agricultural Research Officer to Director of Agriculture, 2<sup>nd</sup> April, 1963.

<sup>15</sup> The term "pops" embraces the condition in groundnuts where mature pods have one or more empty cavities in which nuts have failed to develop or contain shrivelled nuts.

<sup>16</sup> A.O. Ballantyne, 'Agricultural Research in Zambia', *Farming in Zambia* (1966), 11.

<sup>17</sup> Ballantyne, 'Agricultural Research in Zambia', 11.

<sup>18</sup> Interview with Mr. J. Mukuka, Mount Makulu Central Research Station, Chilanga, 31<sup>st</sup> March, 2000.

<sup>19</sup> Interview with Mr. K. Msiska, Mount Makulu Central Research Station, Chilanga, 31<sup>st</sup> March, 2000. He defined 'phytosanitary' as 'plant hygiene'

<sup>20</sup> A Plant Import Permit is sent by the importing country to the exporting country. It states what the importer wants the imported product to be like as per the importing country's phytosanitary regulations. A Phytosanitary Certificate is a response to a Plant Import Permit. It is sent by the exporting country and certifies that the items bought by the importing country are free from injurious pests and conform with phytosanitary regulations.

<sup>21</sup> Government of the Republic of Zambia (hereafter as GRZ), Ministry of Agriculture, *Annual Report of the Research Branch for the year 1965* (Lusaka: Government Printer, 1966), p. 54.

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- <sup>22</sup> GRZ, Ministry of Agriculture, *Annual Report of the Research Branch for the year 1964* (Lusaka: Government Printer, 1965), p. 57.
- <sup>23</sup> *Annual Report of the Research Branch for the year 1964*, p.1.
- <sup>24</sup> Foreword by Mr. E.H.K. Mudenda, *Zambian Review* 2, 3(1964), 111.
- <sup>25</sup> Interview with Mr. S. Siameja, Mount Makulu Central Research Station, Chilanga, 7<sup>th</sup> April, 2000.
- <sup>26</sup> GRZ, *First National Development Plan, 1966-1970* (Lusaka: Office of National Planning and Development, 1966), p. 25.
- <sup>27</sup> N.A.Z., CNP. 1/1/34. 'Central Province: First National Development Plan, Development Prospects'.
- <sup>28</sup> N.A.Z., MAG. 2/8/27, J.B.M. Vogt, 'Research Branch: Its Structure and Functioning', 20<sup>th</sup> March, 1970.
- <sup>29</sup> GRZ, Ministry of Agriculture, *Annual Report of the Research Branch for the year 1969* (Lusaka: Government Printer, 1970), p. 50.
- <sup>30</sup> Keir Cruickshanks, Claude Slater and Paul Hatakwati, 'Research to Produce Beef in Zambia at the Central Research Station, Mazabuka', *Farming in Zambia* 3, 4 (1968), 7.
- <sup>31</sup> GRZ, Ministry of Agriculture, *Annual Report of the Research Branch for the year 1967* (Lusaka: Government Printer, 1968), p. 76.
- <sup>32</sup> *Annual Report of the Research Branch for the year 1969*, p. 98
- <sup>33</sup> GRZ, Ministry of Rural Development, *Annual Report for the Research Branch, 1972-1973* (Lusaka: Government Printer, 1974), p. 157.
- <sup>34</sup> Interview with Mr. E. Musonda, Mount Makulu Central Research Station, Chilanga, 29<sup>th</sup> March, 2000.
- <sup>35</sup> Mr. E. Musonda alluded to the fact that the self-sustainability lies in the fact that the enemies reproduce themselves without further input. The specificity, he noted, lies in the fact that the enemies attack the pests only; the cheapness is a result of farmers not having recurrent investments to make (as is the case with insecticides).
- <sup>36</sup> GRZ, Ministry of Rural Development, *Tenth Anniversary Yearbook* (Lusaka: Government Printer, 1974), p. 21.
- <sup>37</sup> GRZ, Ministry of Rural Development, *Annual Report of the Research Branch, 1971-1972* (Lusaka: Government Printer, 1973), p. 181.
- <sup>38</sup> 'Second National development Plan: A Quick Review of the past 5 years', *Times of Zambia*, 13<sup>th</sup> January, 1972, p. 13.
- <sup>39</sup> GRZ, *Second National Development Plan, 1972-1976* (Lusaka: Ministry of Development Planning and National Guidance, 1971), p. 35.
- <sup>40</sup> Interview with Mr. R. Malikopo, Mount Makulu Central Research Station, Chilanga, 30<sup>th</sup> March, 2000.
- <sup>41</sup> D.S. Mingochi, 'Review of the status of vegetable Research in Zambia', GRZ, Department of Agriculture, *Vegetable Research in Zambia* (Sanhua: Asia Vegetable Research and Development Centre, 1997), p. 7.
- <sup>42</sup> 'Research Choked', *Sunday Times of Zambia*, 22<sup>nd</sup> November, 1977, p. 3.

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- <sup>43</sup> GRZ, Department of Agriculture, *Productive Farming*, 127 (1984), 11.
- <sup>44</sup> GRZ, Ministry of Agriculture and Water Development, *Annual Report of the Research Branch 1979-1980* (Lusaka: Government Printer, 1984), p. 27.
- <sup>45</sup> Interview with Dr. K. Munyinda, Lusaka, October 27, 1999.
- <sup>46</sup> R.Q. Crunfurd, 'Review of the more important reports and papers in Mount Makulu Library', Research Memo. No. 28. *Ecology and Pasture Research in Zambia (1933-1979)* (Lusaka: Mount Makulu Central Research Station, 1979), p. 12.
- <sup>47</sup> Government of the Republic of Zambia and the United Nations in Zambia, Report: Prospects for sustainable Human Development in Zambia-More choices for our people, 1996, p.4
- <sup>48</sup> Interview with Dr. K. Munyinda, Lusaka, 27<sup>th</sup> October, 1999.
- <sup>49</sup> GRZ, Ministry of Rural Development, *Annual Report of the Research Branch 1973-1974* (Lusaka: Government Printer, 1975), p. 7.
- <sup>50</sup> *Annual Report of the Research Branch 1973-1974*, p. 7.
- <sup>51</sup> GRZ, Ministry of Agriculture and Water Development, *Annual Report of the Research Branch for 1977-1978* (Lusaka: Government Printer, 1984), p. 1.
- <sup>52</sup> J.A. Howard, G.M. Chitalu and S.M. Kalonge, *The Impact of Investments in Maize Research and Dissemination in Zambia* (Michigan: Michigan State University, 1973), p. 24.
- <sup>53</sup> GRZ, *Third National Development Plan, 1979-1983* (Lusaka: Office of the President, National Commission for Development Planning, 1979), p. 154.
- <sup>54</sup> GRZ, *Third National Development Plan, 1979-1983*, p. 191.
- <sup>55</sup> *Annual Report of the Research Branch 1979-1980*, p. 14.
- <sup>56</sup> M. Ndiyoi and M. Phiri, 'Institutionalisation of the Farming Systems Approach in Zambia', in Ponniah Anandajayasekeram and Ted Stiwell (eds.), *Institutionalisation of Farming Systems Approach in Eastern and Southern Africa* (Mbabane: The Southern African Association for Farming Systems Research – Extension, 1998), p. 222.
- <sup>57</sup> For details, read Stuart A. Kean and Lingston P. Singogo, *Ofor Case Study No. 7: Zambia Organisation and Management of the Adaptive Research Planning Team* (Lusaka: Ministry of Agriculture Research Branch, 1988).
- <sup>58</sup> Stuart A. Kean, Lingston P. Singogo and Alistair J. Sutherland, 'The Adaptive Research Planning Team', in Adrian P. Wood et al (eds), *The Dynamics of Agricultural Policy and reform in Zambia*, p. 347.
- <sup>59</sup> David H. Gray, 'The Seeds Act and the Farmer', *Farming in Zambia* 3, 4 (1969), 12.
- <sup>60</sup> N.A.Z., MAG. From Chief Agricultural Research Officer to Director of Agriculture, 14<sup>th</sup> June, 1968.
- <sup>61</sup> NRG, Department of Agriculture, *Annual Report, 1955*, Appendix 1.
- <sup>62</sup> *Annual Report of the Research Branch for the year 1965*, Appendix 1.
- <sup>63</sup> *Annual Report of the Research Branch 1979-1980*, pp. 356-360.

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<sup>64</sup> NRG, Department of Agriculture, *Annual Report, 1956*, p. 1.

<sup>65</sup> GRZ, Ministry of Rural Development, *Annual Report of the Research Branch, 1970-71* (Lusaka: Government Printer, 1971), p. 3.

## CHAPTER FOUR

### THE IMPACT OF AGRICULTURAL RESEARCH AT THE CENTRAL RESEARCH STATION ON AGRICULTURE IN ZAMBIA, 1950-1980

This chapter discusses the impact of agricultural research work at Mount Makulu Central Research Station and its affiliate stations on agriculture in Zambia. We examine the techniques used in the dissemination of agricultural technology and research findings to the intended targets. Our argument is that, in this context, the dissemination of agricultural research findings depended to a very large extent on the establishment of strong links between the Department of Extension services at the Ministry of Agriculture and the Central Research Station. Indeed, there were efforts by the Central Research Station and the Extension Branch of the Department of Agriculture to disseminate research findings and other relevant agricultural information to the intended targets through the use of a number of techniques. However, these efforts were constrained by a number of factors.

The chapter is divided into three sections. In the first section, we examine the methods employed in the dissemination of agricultural technology and research findings. In the second section we discuss the constraints on the dissemination of agricultural research findings. In the final section we have focused on the major effects of agricultural research done at the Central Research Station on agriculture in Zambia.

#### **Dissemination of Agricultural Technology and Research Findings**

In agriculture, dissemination of technology and research findings depends heavily on extension services. Makings defines extension in agriculture as, 'the means by which farmers are helped to improve their production usually by governments through teaching and other aids.'<sup>1</sup> The reason why extension is so important is that it

deals directly with farmers. Extension officers spend most of their time in the field disseminating information to farmers. Practically, many research projects in agriculture are as a result of questions raised by the Extension Service.

Throughout the colonial period the major beneficiaries of agricultural extension services were the settler farmers. The services received special support during the Federal period, 1953-1963. During this period, the Ministry of Agriculture was split into two ministries, namely, the Ministry of European Agriculture and the Ministry of African Agriculture. Extension and advisory services for African agriculture were provided by the territorial Ministry of African Agriculture working with and through the Native Authorities.<sup>2</sup> Many officers in the Ministry of African Agriculture had low educational qualifications. Mukutu hinted on this by stating that, 'because of consisting of rejects from the Federal system, both research and extension advice in the Ministry of African Agriculture were substandard.'<sup>3</sup> In the Ministry of European agriculture, the officers who were employed had good qualifications. In consequence, extension and advisory services were much better in the Ministry of European Agriculture than in the Ministry of African agriculture. This disparity was clearly reflected in the statement by the Director of Agriculture when he stated in 1958 :

The Federal Ministry of Agriculture has been responsible for European agricultural affairs for over two years. The extension services now provided for some 1400 European farmers are of the most lavish in the world today... the European farming community is well pleased with the service it is receiving.<sup>4</sup>

The agricultural extension services to farmers were provided by both the Central Research Station officers and the officers from the Department of Extension Services in the Ministry of Agriculture. Many methods were employed in the dissemination of agricultural technology and research findings to farmers and other interested parties.

Field days were popular fora for demonstrating agricultural technology. The field days were held at Regional Stations and at the Central Research Station. They were organised for specific crops at a time and the scientists demonstrated their respective distinct modern techniques of growing them. These field days drew large crowds of both African peasant and European commercial farmers. For instance, at a field day at Magoye Regional Station in 1963, it was reported that, '150 European and African farmers were present.'<sup>5</sup> Even after independence, field days continued to be popular fora for demonstrating agricultural technology and research findings in the country. They became a common feature at the Central Research Station.

Like for the pre-1950 period, agricultural shows continued being an important aspect of extension work. At these shows exhibits from Regional Stations and the Central Research Station were displayed. Nationally, the shows were held in Lusaka at the Lusaka Show Grounds. There were very strong links between the local or regional shows and national agricultural shows. The trend has continued to date.

Another popular way of disseminating agricultural research findings was through the production of publications for the farming community and any other interested parties. In 1963, for example, over 30,000 posters, pamphlets and handouts were issued on different forms of agricultural technology.<sup>6</sup> After independence, a number of farmers subscribed to journals and magazines. Most of the articles in the journals and magazines were written by professional staff of the Central Research Station and the Regional Stations. Many important articles appeared in the farmers' journals such as, *Farming in Zambia*, *Commercial Farmers' Bureau* and *Productive Farming*. Other equally important and useful articles appeared as departmental publications.

After Zambia attained her independence, a new section in the Ministry of Agriculture was created. This was the Communications Section. The idea behind the

formation of this section was to make agricultural communications easier. Its major task was to disseminate information to farmers on aspects of agriculture such as pest and disease control. It further sought to improve the link between research and extension, thereby ensuring more efficient use of research findings. It also provided a channel through which farmers had feedback from extension and research workers. In 1968, the Communications Section became the National Farming Information Service (NFIS), later popularly known as the Rural Information Service (RIS).<sup>7</sup>

The Rural Information Service sought to reach out to the rural farmers through radio broadcasting. This led to the birth of the Radio Farm Forum programme on the national Radio Station with the assistance of the United Nations Education, Scientific and Cultural Organisation (UNESCO) in 1966. In that year, the UNESCO mission visited Zambia and recommended that the Radio Farm Forum programme be started on the national Radio Station in the country. The Radio Farm Forum programme, it was noted, was doing very well in many countries throughout the world.<sup>8</sup> Farmers would be assembled into small radio listening groups. They would then listen to an agricultural problem introduced to them, prepare questions and make them known to the local extension worker. Each forum initiated an average of three questions on every subject.<sup>9</sup> Answers would then be obtained from extension officers in their respective areas, and the research officers at Mount Makulu Central Research Station. They would then be broadcast in the subsequent fortnight's programme. Small pamphlets containing questions and answers would be published in English and local languages and subsequently distributed among the forum members.

The response to the Radio Forums was so gratifying that, 'by 1969, there were 437 forums throughout the country.'<sup>10</sup> These forums which were part of the first Four Year Development Plan were described as, 'one of the main achievements in the field of agricultural extension services in Zambia.'<sup>11</sup> Other radio programmes on

agriculture mainly for the rural farmer were introduced by the Rural Information Services. These included, Rural Notebook, Farm Magazine and Rural Question Time. Television was another medium for disseminating information to farmers. However, only a limited number of programmes were produced for television in the 1970s, and only farmers in urban areas benefited more.<sup>12</sup>

Provincial Experimental Committees (PEXCOS) were introduced before the inception of the Adaptive Research Planning Team as a way of reaching out to farmers. It was intended that scientists in the Research Branch would carry out research programmes on the basis of programmes passed on to them by the PEXCOS. The PEXCOS would go on tour with the objective of enabling scientists to interact with extension workers and farmers. An assessment would be made of the extent to which research recommendations were being adopted. The PEXCOS were also to identify farmers' problems requiring research. Usually, the trip took three days during which time the group would visit two or three districts.<sup>13</sup> At the conclusion of every tour, the committee would then discuss the findings of research and any other problems presented by farmers in the toured districts. These tours, however, were not effective. Few farmers were visited and consequently, even if a problem was identified, it was never known how widespread it was. The failure of the PEXCOS was also attributed to the fact that neither the extension workers nor researchers were trained in social or rural agricultural sociology.<sup>14</sup> Therefore, their techniques of relaying messages were poor. As a result of these weaknesses, the PEXCOS did not effectively formulate research programmes.

In 1978, the Department of Agriculture adopted the Training and Visit system as a way of disseminating information to farmers. The introduction of this system was born out of the realisation that many of the field staff were not well trained. Additionally, there had hitherto been no systematic programme for regular contact

between farmers and extension staff. Under the Training and Visit system, field staff regularly visited farmers. Workshops would then be held at district level. During these workshops, field staff would discuss various issues with the farmers. Training was also provided at these meetings. Refresher courses for field staff were also conducted by researchers from the Central Research Station and the Ministry of Agriculture. The major advantage of this system was the intensification of contact between extension workers and farmers.<sup>15</sup> Farm Institutes and Farm Training Centres were also used for passing on agricultural innovations to farmers. These had been set up at independence as a way of broadening the technological base of the farmers.<sup>16</sup> Farm Institutes were set up at provincial level for training additional staff. Farm Training Centres were set up at district level for training local farmers in various agricultural courses. These Farm Training Centres became particularly important centres for the dissemination of food storage information. In 1973, the Food Conservation and Storage Unit of the Central Research Station set up two maize storage demonstrations at Farm Institutes and Farm Training Centres throughout the country.<sup>17</sup> In 1977, the same unit gave a course on preservation of perishable produce at Monze Farm Training Centre.<sup>18</sup>

The creation of the post of Research-Extension Liaison Officer at the Central Research Station marked a major turning point in the Central Research Station's efforts at effectively reaching out to farmers. The post was created due to the realisation that it was taking long for research findings to reach the intended targets. In February 1980, for the first time, a Research-Extension Liaison Officer was appointed and was based at the Central Research Station.<sup>19</sup> His major tasks included running provincial extension training workshops and preparing a series of extension worker handbooks. It was noted that a major handicap in the Extension Branch was the lack of reference materials. With the appointment of the Research-Extension

Liaison Officer, it was hoped reference materials would be prepared and this would enhance the understanding of research findings and extension workers. The Liaison Officer was also the main link between the Research Scientists and the Extension Officers.

Certainly, major attempts were made by the Central Research Station and extension workers to disseminate agricultural technology and research findings to farmers. Dissemination of agricultural innovations was, however, constrained by a number of factors. Because of these difficulties, the Station did not reach as many farmers as was expected.

### **Constraints to the Dissemination of Agricultural Technology and Research**

#### **Findings.**

A major constraint to the dissemination of agricultural technology and research findings was that there were inefficient links between research and extension. The links between research work and extension work were poor right from colonial times. As early as 1960, there were complaints that a wide gulf existed between the Research Branch and field staff in the provinces. In a letter to the Chief Research Officer, a Mr. Johnson complained about the failure by research staff to monitor experiments in certain districts. He lamented :

These experiments, though simple, would be of great importance to these agriculturally little known regions. I have been to these places and I know how disappointed the staff are, how isolated they feel because so very little in their work is displayed at Mount Makulu.<sup>20</sup>

These poor links between research and extension continued even after independence. Before the formation of the Adaptive Research Planning Team (ARPT) in 1980, there were few formal occasions when research and extension workers would meet and communicate effectively. Consequently, a situation developed where extension workers considered that much research work was “ivory-towered” and of little

relevance to the small-scale farmers.<sup>21</sup> Certainly, the poor two-way communication system was detrimental to the effective dissemination of modern agricultural knowledge.

Another drawback to extension work was the Extension Branch's lack of capacity to effectively carry out its functions.<sup>22</sup> Most of the extension workers lacked adequate training and were considered underqualified for their positions. Mukutu bemoaned the lack of qualified personnel in the Extension Branch when he stated that 'for a long time, Agricultural Extension Officers were not of high quality. In consequence, extension suffered.'<sup>23</sup> The poor qualifications meant that even when messages were relayed to them by scientists, it was not easy to translate them into messages that could easily be understood by farmers.

Limited funds allocated for agricultural extension adversely affected the work of the Extension Branch and Research Scientists. The funds allocated for extension were not adequate to meet the costs involved in disseminating information. One consequence of poor funding was that the number of farmers who could be reached by extension workers was low. This was due to the fact that travel and transport funds were seriously inadequate. As a result of this situation, Dodge noted, 'many senior extension officers spent 80% of their time behind their desks resulting into the suffering of extension programmes'.<sup>24</sup> Muchimba observed that due to the chronic shortage of transport, even when the staff of the Central Research Station were made aware of certain plant diseases, they could not go to the affected areas.<sup>25</sup> In the 1975-1976 season, for example important work on the control of a banana disease, the Black Leaf Streak and the survey of Cassava disease in the Luapula Valley were discontinued due to lack of transport.<sup>26</sup>

Resource constraints hindered the prospective recipients from acquiring information on agricultural research findings. Even when information was made

available by extension workers and scientists, it was not received by all the intended targets. A report of 1963 noted that by 1963 many, perhaps most of the African farmers owned no radios, subscribed to no papers and neither spoke nor understood English very well.<sup>27</sup> Therefore, even when extension services were made available, especially those done in English, most of the native farmers did not benefit from them. Various schemes introduced before independence to train Africans in the techniques of modern farming were not successful. 'In Northern Rhodesia', Hellen noted, 'there were frequent complaints about costs involved in farm mechanisation.'<sup>28</sup> Therefore, the persons participating in the schemes were disappointingly few, and their influence on others was not very great.<sup>29</sup> Even after independence, farm mechanisation was confined mainly to commercial farmers. The subsistence farmer was handicapped by the lack of readily available cash to purchase the gadgets required in farm mechanisation.

In view of the outlined constraints to the successful dissemination of agricultural knowledge, some research findings that could have altered the course of agricultural development in Zambia did not reach the intended targets. Despite these pitfalls to extension, agricultural research work at the Central Research Station and its affiliate stations contributed greatly to the development of agriculture in Zambia. This is the focus of the next section of this chapter.

### **Effects of Agricultural Research at the Central Research Station on Agriculture in Zambia**

Despite the unanticipated problems it faced in the dissemination of agricultural research findings, the Central Research Station had, by 1980, recorded a number of successes that had a positive impact on agriculture in Zambia. The policy of directing work to the problems as defined by extension staff had paid off. As far as the main

crops were concerned, extension workers had, by 1980, been provided with proven scientific recommendations for implementation.

Marked successes were particularly recorded in the maize research. As a result of the desire to provide the urban population with a dependable source of cheap staple food and improve small holder incomes, the government was greatly involved in phases of maize production.<sup>30</sup> The ultimate goal was self sufficiency which was, indeed, achieved by 1968. By 1968, a surplus situation in maize production had risen because of the general use of improved hybrid maize seed.<sup>31</sup> A major development in the 1970s was a shift from giving more support to the few commercial farmers to more support to the many small-scale farmers. In addition, in the 1970s, there was emphasis on the production of maize seed varieties which were drought resistant and varieties that had a high protein content. As a result of the general research recommendations, by the mid-1970s, the acreage under maize production increased. For instance, it was reported in the 1973-1974 farming season that :

The general research recommendations for maize growing are well adhered to by farmers all over the country and where followed, they have given a bumper harvest.<sup>32</sup>

The financial assistance from the Swedish International Development Agency (SIDA) to fund maize breeding marked a major turning point in the maize research and dissemination process. One of its objectives was to provide training for research scientists and extension officers.<sup>33</sup> Indeed, the SIDA funds were a great booster to maize research and dissemination of research findings in the country. New maize hybrids and varieties were being developed. These were developed in such a way that they were better adapted to the different categories of farmers in Zambia.

The ten-year investigations into cotton by the Central Research Station yielded excellent results. The cotton trials at the station commenced as early as 1958, and by 1968, cotton was firmly established as a farm crop in the country. Before this date, the

positive research into cotton had already paid off. A lot of cotton was being grown for the export market. With this positive prospect, the government decided to establish a local company to utilise the cotton. In 1966, Kafue Textiles of Zambia was established at Kafue, a small town fifty kilometres south of Lusaka, on the Great North Road. The Chief Agricultural Research Officer noted cheerfully in 1968 that, 'it is most encouraging to note that our success with cotton has been underwritten by the construction of a textile mill at Kafue.'<sup>34</sup> Kafue Textiles of Zambia, founded and incorporated on November 3, 1966 was the first integrated cotton mill in Zambia manufacturing a wide range of high quality fabrics from indigenous cotton. This indeed was a booster to agriculture.

The research into tea also had a positive impact on agriculture in Zambia. The first serious research work on tea was initiated in 1965 when nitrogen and phosphate fertiliser trials were planned at Misamfu and Mpika. As a consequence of research work, it was concluded that tea could be grown satisfactorily in the northern parts of Zambia. This led to the establishment of an embryo tea industry at Kawambwa in 1970.<sup>35</sup> Before the establishment of the tea estate, all Zambia's tea requirements were met through importation mainly from Sri Lanka.

In the Soya-bean research, many successes were achieved. In the mid-1970s, much interest was shown in this crop by small-scale and commercial farmers, and even private companies. In the 1976/1977 farming season and the 1977/1978 farming seasons, production was so high that the usual local markets were glutted.<sup>36</sup> This forced some individual farmers to start processing Soya-bean seeds to produce their own animal feed. Animal feed producing companies such as the National Milling Company, were using it to enrich their products. As a result of the popularity of this crop, by 1980, the Central Research Station had begun disseminating information on its production to the small-scale farmers. A seed factory in Choma and the meat

industry in Chingola were other major users of the Soya-beans. In 1980, a request to purchase large quantities of Soya-bean seeds was received from Benin.<sup>37</sup> The request was quickly and positively responded to. This was indeed a time to benefit from the effects of wonderful Soya-bean research in the country.

One aspect of agronomy work done at the Central Research Station was the nitrogenous manuring of crops. Research in this field led to the need for a local nitrogenous fertiliser company. The increased use of imported nitrogenous fertilisers had prompted the Federal Government as early as 1958 to start making plans for the construction of a chemical fertiliser plant in Northern Rhodesia. However, by the end of the Federation, this had not been done. After the Federation, it was realised that there was need for Zambia's farmers to have a cheap and regular source of chemical fertiliser. Therefore, under the first Four Year Development Plan, a fertiliser factory, Nitrogen Chemicals of Zambia was established in 1967. Its establishment led to the cutting down on fertiliser imports, and saving large amounts of foreign exchange. In 1966, for example, K3.6 million was spent on fertiliser imports into the country.<sup>38</sup> With the opening of the plant, the country not only saved some money but Zambian farmers had access to affordable chemical fertiliser. All this was as a result of research done at the Central Research Station way back in 1950s.

In the Seeds section, marked successes were recorded. Right from its inception in 1964 and up to 1980, seed production and certification was impressive. The number of farmers growing certified seed increased every year. Commenting on the reasons for prosperity in the Seeds Section, Muliokela stated that 'research into seeds was mainly directed at the large scale farmer who was easily monitored. At the same time, the Seeds section was linked to International Seed Testing and Certification Schemes. Consequently, the tests done at the station were reliable and the seeds produced were of high quality.'<sup>39</sup> As shown in Table I, at its inception, 34

seeds were tested in the seed testing laboratory.<sup>40</sup> In 1980, over 3,660 sample seeds were tested while 8,709 tones of seed were produced by the seed growers and certified by the Seeds Section.<sup>41</sup> This was an indication that the seed users, the farmers, were increasingly becoming aware of the detrimental effects of using uncertified seed. This awareness was in itself a very important and positive impact of research in agriculture in the country.

During the period under study, many soil sample analyses were done in the Soils section. The original major programme of the section was to offer soil testing services to farmers and to give them fertiliser advice. Over time, however, the section began to offer crop advisory services as well. In the 1970s, the section began giving advice to the government and fertiliser companies on the types and compositions of fertilisers suited to a range of crops. From 500 analyses done at the Station in 1954,<sup>42</sup> the number increased to 1,200 in the 1977-1978 season.<sup>43</sup> These soil analyses led to the evaluation of the soil fertility of different soil types in Zambia. Where specific harmful conditions of the soils were identified, appropriate remedies were carefully recommended. Damaseke, however, lamented that, 'because of the costs involved in having a soil test done, it was mainly the emergent and commercial farmers who benefited from the soil testing service'.<sup>44</sup>

**TABLE II**  
**SEEDS SECTIONS, 1964-1980**

<b>YEAR</b>	<b>SEEDS SAMPLES TESTED</b>
1964	34
1965	148
1966	366
1967	534
1968	885
1969	1,207
1970-1971	2,576
1971-1972	2,808
1972-1973	3,057
1973-1974	2,903
1974-1975	3,500
1975-1976	3,000
1976-1977	3,108
1977-1978	2,800
1978-1979	Data not available
1979-1980	3,660

SOURCE: COMPILED FROM ANNUAL REPORTS OF  
THE RESEARCH BRANCH 1964-1980

The work of the Food Conservation and Storage Unit of the Central Research Station had a great impact on small-scale farming. Right from its inception, the section targeted the small-scale farmers. In 1970, the section embarked on a campaign aimed at sensitizing the rural farmers on the importance of good food preservation methods. Its work programme included farm visits during which time storage problems were discussed with farmers. Many areas in rural Zambia were visited in an effort to improve food storage and preservation in the country. Because of these campaigns, many requests for advice were received by the section. By the 1973-1974 season, the requests for advice falling within the terms of reference of the unit had become so numerous that they could not be handled by the small nucleus of staff at the Station. In the 1979-1980 season, the unit sent materials for the construction of storage bins to 1000 farmers in seven provinces in the country.<sup>45</sup> They were sent because of the increased demands for advice from mainly the rural farmers.

Marked successes were also recorded by the Plant Protection section. As early as 1952, the principal European and several of the African farming areas were visited in connection with plant disease problems in the territory. This led to the identification of many diseases and the compilation of their histories. From that time, plant diseases which could have greatly reduced agricultural production were being identified and controlled. A major break-through was made in 1966 when a cotton disorder known as the Crumple-Top<sup>47</sup> which had greatly reduced cotton yields in the Southern Province was successfully combated. In the biological control of pests, a lot, too, was achieved. By 1976, seven projects to combat plant diseases by bio-control agents were in hand at the Station. Of great significance was the successful biological control of a notorious pest, called the Potato Tuber Moth in 1976. The pest had inflicted heavy losses on the potato tubers in the fields and storage facilities for many years. Biological control against it was initiated in 1968. By 1976 it was

suppressed and it was reported that, 'the annual gains of K50,000 in potato production were attributed to bio-control.'<sup>46</sup>

From the time the Federation broke up, phytosanitary regulations were successfully implemented. This was reflected in the yearly increase of the number of plant import permits issued and consignments destroyed. Many farmers co-operated well with phytosanitary regulations by destroying condemned crops as per phytosanitary regulations. The increase in the number of plant permits issued was also a clear reflection of public awareness of the need to obtain permits. As shown in Table III, in 1965, for example, 228 plant import permits were issued<sup>47</sup> In 1980, plant import permits issued were 283.<sup>48</sup> The number of Phytosanitary certificates issued had also increased markedly by 1980.

Despite the problems initially faced by the Central Research Station to provide research services to the farmers, the impact of its work was eventually felt country-wide, more so by commercial farmers. The agricultural knowledge introduced transformed the farming systems of many commercial farmers. However, although the small-scale farmers predominated the agricultural industry, much of the disseminated information did not reach them. Osei-Hwedie observed that by 1980, many small-scale farmers did not have adequate maize varieties suitable for their farming needs.<sup>49</sup> With the inception of the Adaptive Research Planning Team (ARPT) in 1980, major efforts were made at reaching out to the small-scale farmer.

**TABLE III**  
**PHYTOSANITARY SECTION, 1964-1980**

<b>YEAR</b>	<b>PHYTOSANITARY CERTIFICATES</b>	<b>PLANT IMPORT PERMITS ISSUED</b>
1964	-	-
1965	-	228
1966	26	252
1967	28	271
1968	20	334
1969	32	169
1970-1971	46	210
1971-1972	51	317
1972-1973	-	258
1973-1974	32	280
1974-1975	39	300
1975-1976	70	267
1976-1977	42	210
1977-1978	38	260
1978-1979	Data not available	Data not available
1979-1980	143	283

SOURCE: COMPILED FROM ANNUAL REPORTS OF THE RESEARCH  
BRANCH, 1964-1980

## **Conclusion**

In this chapter, we have argued that right from the inception of the Central Research Station, a lot was done by both the Central Research Station staff and staff of the Extension Branch in the Ministry of Agriculture in ensuring that research findings reached the intended targets. It has been observed that in a bid to disseminate information to farmers and other interested parties, a variety of extension techniques were employed. Researchers and Extension Officers, we have noted, encountered a lot of problems as they tried to disseminate agricultural knowledge to farmers. Despite these constraints, however, it has been observed that the work of the Central Research Station had a positive impact on the reached targets and agriculture in the country.

Indeed, by 1980, as a result of research work at the Station, there were improvements in the agricultural practices of the farmers who were reached. Though not wholly successful, the Central Research Station's work fundamentally altered the course of agriculture in Zambia.

## ENDNOTES

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- <sup>1</sup> S.M. Makings, *Agricultural Problems of Developing Countries* (London: Oxford University Press, 1967), p. 62.
- <sup>2</sup> Northern Rhodesia Government (hereafter as NRG), *Advisory Commission on the Review of the Constitution of the Federation of Rhodesia and Nyasaland: Survey of Developments Since 1953* (London: Her Majesty's Stationery Office, 1960), p. 405.
- <sup>3</sup> Interview with Mr. Namukolo Mukutu, Lusaka, June 6, 2000.
- <sup>4</sup> N.A.Z., MAG.1/4/2. From Director of Agriculture to the members of Agricultural and Natural Resources, 26<sup>th</sup> February, 1958.
- <sup>5</sup> NRG, Department of Agriculture, *Annual Report, 1963* (Lusaka: Government Printer, 1964), p. 26.
- <sup>6</sup> NRG, Department of Agriculture, *Annual Report, 1963*, p. 11.
- <sup>7</sup> Ronald Watts, Peter E. Ngangula and A. Werner Haas, 'Agricultural Communications', in Adrian P. Wood, Stuart A. Kean, John T. Milimo and Dennis Michael Warren (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia* (Iowa: Iowa University Press, 1990), p. 357.
- <sup>8</sup> Government of the Republic of Zambia (hereafter as GRZ), *Zambia's Plan at Work 1966-1970* (Lusaka: Office of National Development and Planning, n.d.), p. 55.
- <sup>9</sup> Silas Muntanga, 'Radio Farm Forums are a Success', *Farming in Zambia* 3, 2 (1968), 5.
- <sup>10</sup> Silas Muntanga, 'Radio Farm Forum', *Farming in Zambia* 4, 2 (1969), 36.
- <sup>11</sup> Muntanga, 'Radio Farm Forum', 36.
- <sup>12</sup> Watts, Ngangula and Haas, 'Agricultural Communications', p. 361.
- <sup>13</sup> Stuart A. Kean and Lingston P. Singogo, *Ofor Case Study No. 1: Zambia Organisation and Management of the Adaptive Planning Team* (Lusaka: Ministry of Agriculture Research Branch, 1988), Appendix 1.
- <sup>14</sup> GRZ, Ministry of Rural Development, *Annual Report of the Extension Branch 1970-1971* (Lusaka: Ministry of Rural Development, 1971), p. 47.
- <sup>15</sup> Gerard Lof and Russell M. Mulele, 'The Changing Role of the Extension Service', in Adrian P. Wood et al (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*, p. 349.
- <sup>16</sup> Interview with Mr. E.H.K. Mudenda, Lusaka, November 15, 1999.
- <sup>17</sup> GRZ, Ministry of Rural Development, *Annual Report of the Research Branch 1972-1973* (Lusaka: Government Printer, 1973), p. 144.
- <sup>18</sup> GRZ, Ministry of Agriculture and Water Development, *Annual Report of the Research Branch 1977-1978* (Lusaka: Government Printer, 1984), p. 221.
- <sup>19</sup> GRZ, Ministry of Agriculture and Water Development, *Annual Report of the Research Branch 1979-1980* (Lusaka: Government Printer, 1984), p. 28.
- <sup>20</sup> N.A.Z., MAG, 2/8/17. From C.E. Johnson to Director of Agriculture, 14<sup>th</sup> April, 1960.
- <sup>21</sup> Kean and Singogo, *Zambia Organisation and Management of the Adaptive Research Planning Team*, Appendix 1.

- 
- <sup>22</sup> GRZ, Ministry of Agriculture, *National Research Action Plan* (Lusaka: Ministry of Agriculture: Research Branch, 1991), p. 2.
- <sup>23</sup> Interview with Mr. N. Mukutu, Lusaka, 6<sup>th</sup> June, 2000.
- <sup>24</sup> Doris J. Dodge, *Agricultural Policy and Performance in Zambia* (Berkeley: University of California, 1977), p. 277.
- <sup>25</sup> Interview with Mr. S. Muchimba, Mount Makulu Central Research Station, Chilanga, 28<sup>th</sup> March, 2000.
- <sup>26</sup> GRZ, Ministry of Rural Development, *Annual Report of the Research Branch 1975-1976* (Lusaka: Government Printer, 1976), p. 10.
- <sup>27</sup> Martin W. Howard, 'Agricultural Education in Northern Rhodesia', A report prepared in collaboration with the United States Agency for International Development (USAID), 1963.
- <sup>28</sup> John A. Hellen, *Rural Economic Development in Zambia 1890-1964* (London: C. Hurst and Company, 1968), p. 270.
- <sup>29</sup> E.R. Baldwin, *Economic Development and Export Growth: A Study of Northern Rhodesia 1920-1960* (London: Cambridge University Press, 1966), p. 202.
- <sup>30</sup> J. A. Howard, G. M. Chitalu and S. M. Kalonge, *The Impact of Investments in Maize Research and Dissemination in Zambia* (Michigan: Michigan State University, 1973), p. 2.
- <sup>31</sup> C.S. Lombard and A.H.C. Tweedie, *Agriculture in Zambia since Independence* (Lusaka: National Education Company of Zambia, 1972), p. 22.
- <sup>32</sup> N.A.Z., C.N.P. 1/5/28. Annual Report for Kabwe Regional Research Station 1973-1974.
- <sup>33</sup> Howard, Chitalu and Kalonge, *The Impact of Investments in Maize Research and Dissemination in Zambia*, p. 29.
- <sup>34</sup> N.A.Z., MAG, 2/8/22. From Chief Agricultural Research Officer to the Director of Agriculture, 14<sup>th</sup> June, 1968.
- <sup>35</sup> GRZ, Ministry of Rural Development, *Tenth Anniversary Yearbook of the Ministry of Rural Development* (Lusaka: Government Printer, 1974), p. 21.
- <sup>36</sup> F. Javaheri, Soya-bean Co-ordination Report Part 1, 1977/1978 Season, Mount Makulu Central Research Station, 1978.
- <sup>37</sup> *Annual Report of the Research Branch 1979-1980*, p. 112.
- <sup>38</sup> GRZ, *Zambia's Plan at Work 1966-1970*, p. 25.
- <sup>39</sup> Interview with Dr. S. Muliokela, Golden Valley Agricultural Research Trust, 5<sup>th</sup> April, 2000.
- <sup>40</sup> David H. Gray, 'The Seeds Act and the Farmer', *Farming in Zambia*, 4, 3 (1969), 13.
- <sup>41</sup> *Annual Report of the Research Branch, 1979-1980*, p. 27.
- <sup>42</sup> J.K. McPhillips, 'Soil Testing –An Aid to the Farmer', *Farming in Zambia*, 1, 3 (1966), 10.
- <sup>43</sup> *Annual Report of the Research Branch 1977-1978*, p. 11.
- <sup>44</sup> Interview with Mr. M. Damaseke, Mount Makulu Central Research Station, Chilanga, 29<sup>th</sup> March, 2000.

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<sup>45</sup> *Annual Report of the Research Branch, 1979-1980*, p. 329.

<sup>46</sup> F. Ahmed, 'Biological Control of Plant Pests in Zambia', *Farming in Zambia*, 10, 3 (1976), 38.

<sup>47</sup> GRZ, Ministry of Agriculture, *Annual Report of the Research Branch 1965* (Lusaka: Government Printer, 1966), p. 55.

<sup>48</sup> *Annual Report of the Research Branch 1979-1980*, p. 23.

<sup>49</sup> Bertha Z. Osei-Hwedie, 'Food Crisis in Zambia', in Kwaku Osei-Hwedie and Muna Ndulo (eds.), *Issues in Zambian Development* (Kinshasa: Omenana Nyangwe, 1985), p. 126.

## CHAPTER FIVE: CONCLUSION

Our study has highlighted the development of agricultural research in Zambia from 1950 to 1980. The focus of the study has been Mount Makulu Central Research Station because of its importance as the country's first national agricultural Research Station and for its co-ordinating agricultural research throughout the country. The study had several objectives. It attempted to identify the major researches that were carried out in Zambia prior to the setting up of the Central Research Station. It also sought to identify the major researches that were conducted at the Central Research Station from 1950 to 1980. It further sought to establish the extent to which the Central Research Station liaised with the Extension branch of the Department of Agriculture and with its affiliate stations in reaching out to the intended targets. It also tried to identify the major bottlenecks that hindered research findings from reaching the intended targets. Finally, it attempted to identify the areas that benefited most from the Station's research findings.

From the study, several major conclusions have emerged. Prior to 1950, major efforts were made at fostering agricultural research in Zambia. The influx of settler farmers into Northern Rhodesia had as early as 1912 prompted the British South African Company (BSAC) to set up research institutions with the hope of solving the myriad of problems faced by these migrant farmers. During the era of the British South Africa Company, research work was basically experimental in nature. Concentration was on tree crop production and the testing of a variety of crops for resistance to diseases and changing weather patterns. Crops such as maize, cotton, groundnuts, coffee and beans were tested for yield potential. Unfortunately, these institutions were not as successful as anticipated. Among other reasons, the company itself was instrumental in their collapse. Faced with a number of problems after the First World War, the Company had begun

contemplating leaving the country. Therefore, its focus was no longer on agriculture but in investments that would yield superior rates of return. These research institutions set up during the rule of the Company though lacking proper research tools did much to spearhead agricultural development in Zambia.

British Colonial Office rule from 1924 was one of increased research into agriculture. Many research institutions were established with the hope of solving the major problems facing the farmers in Northern Rhodesia. Under the Colonial Office rule, research institutions were set up not only in areas occupied by settlers but also in the African areas. In the African areas, focus was on research into the prevention of soil erosion and the improvement of the quality of soil fertility through manuring. In the settler areas, plant disease identification was emphasized. Research into wheat and tobacco received a lot of attention. Doubtlessly, the increased research into agriculture had by 1950 led to some improvements in agricultural standards although the process was extremely slow. Among other reasons, the lack of specialist staff was a major drawback to the successful conducting of agricultural research work. It was the need for specialist staff to solve the multifarious problems facing farmers in the country that, among other reasons, prompted the British Government to embark on a process of fostering co-ordinated agricultural research. This, ultimately led to the birth of Mount Makulu Central Research Station in 1950.

Between 1950 and 1980, a lot of agricultural research work was conducted at the Central Research Station. Development plans in both colonial and post-colonial Zambia had placed a lot of emphasis on increased research into agriculture. At its inception, the Central Research Station focused on soil surveying, the identification of plant diseases, pasture research, plant breeding, laboratory research work and the undertaking of field

trials. Over the years, there was an increase in the volume of work conducted at the Central Research Station. Many sections were started by 1980. These included the Plant protection section, the Seeds section, the Food Conservation and Storage unit, the Farm machinery section and the Biometrics section. Research into fruit trees, vegetables and tuber crops had by 1980 begun receiving a lot of attention. Doubtlessly, in spite of the numerous constraints to its work, within a thirty year scope, the station had grown both in size and strength, a clear indication that much had been done in the way of serious agricultural research work.

During this period a number of affiliate stations (Regional Research Stations and Substations) were established. These liaised with the Central Research Station resulting into a co-ordinated research programme. However, links between the Extension branch of the Department of Agriculture and the Central Research Station were poor. Before the inception of the Adaptive Research Planning Team, there were few formal occasions when research workers and extension workers met. This poor two-way communication system was detrimental to the effective dissemination of agricultural knowledge. It was not until 1980, with the appointment of a Research-Extension Liaison Officer that links between the research workers and extension workers became strong.

The study also noted that the Research Station's efforts at reaching out to intended targets were constrained by a number of factors. In a bid to reach out to targets, the Station had employed a number of dissemination techniques which, however, were thwarted by a number of factors. A major bottleneck was the limited allotting of funds for agricultural extension. During the period under study, research and extension staff became deskbound mainly due to lack of funds for transport. This, indeed, was

detrimental to the dissemination process and to agricultural development in general. This, and other institutional disincentives, no doubt, over-rode farmers' efforts.

It was not all intended targets who benefited from the Station's research findings. In the colonial era, the major beneficiaries of the research findings were the settler farmers who had more access to extension and advisory services than Africans. In independent Zambia, initially, research was not able to meet the needs of the small-scale farmers. It was mainly the commercial farmers who benefited from the station's research findings. It was not until 1980 that it became apparent to policy makers in the Ministry of Agriculture of the inability of the technology and transfer process to meet the needs of the small-scale farmers. It was the formation of the Adaptive Research Planning Team with its emphasis on adaptive research that helped put the small-scale farmers' needs clearly on the research agenda.

Although the overall performance of agriculture in Zambia has been poor, our contention is that agricultural stagnation should not be blamed on the failure by research scientists to do their work. Agricultural research has been successful. In spite of the many problems faced by the Research Station, huge strides forward were made in agriculture in the country as a result of agricultural research work. Increased researches into Zambia's main crops led to much advancement towards self-sufficiency in the basic crops. Many plant diseases which prior to 1950 were a nuisance to farmers had by 1980 been controlled. The companies such as Kafue Textiles of Zambia (KTZ), Nitrogen Chemicals of Zambia (NCZ) and Kawambwa Tea Company established as a result of research work at the station were at their peak of operations, major sources of revenue for the country. Above all, that the institution has survived up to now is an indication that its efforts at fostering agricultural development in Zambia have not been futile. Those

findings that have reached the intended targets have left a positive mark on Zambia's agricultural history.

## SELECT BIBLIOGRAPHY

### 1. Unpublished Primary Sources

#### 1.1. National Archives of Zambia (NAZ)

##### CNP Series

CNP 1/1/34 Four Year Development Plan: Progress Report, Central Province.

CNP 1/5/28 Quarterly and Annual Reports- Agricultural Department: Central Province: 1974-1975.

##### EP Series

EP 4/2/2 Tour Reports of Eastern Province 1927-1930.

##### MAG Series

MAG 1/4/2 Ministry of African Agriculture- Agricultural Policy Under Federation.

MAG 1/4/5 Agricultural Policy Under Federation.

MAG 2/5/11 Annual Reports: Eastern Province 1941-1948.

MAG 2/5/12 Miscellaneous Reports.

MAG 2/8/1 Fort Jameson Experiments.

MAG 2/8/3 Experiments Shiwan'gandu 1937-1940.

MAG 2/8/4 Experiments Lunzuwa 1939-1943.

MAG 2/8/8 Establishment of the Central Research Station.

MAG 2/8/17 Central Research Station-General.

MAG 2/8/22 Research Programmes 1966-1969.

MAG 2/8/27 Research Programmes 1967-1972.

MAG 2/8/29 Lusaka Wheat Station 1939-1946.

## **District Notebooks**

KTN 1/1	Abercorn District Notebook.
KSB 3/1	Mazabuka District Notebook.
KSA 6/1	Chilanga District Notebook.

## **Library Collections.**

Box 13	Northern Rhodesia Annual Reports 1912-1920.
Box 6	Agricultural Bulletins.
Box 25	Agriculture Miscellaneous.
Box 26	Agricultural Research Miscellaneous.

## **1.2 Miscellaneous Reports**

Howard, Martin, W., 'Agricultural Education in Northern Rhodesia', A report prepared in Collaboration with the United States Agency for International Development, 1963.

Javaheri, F., Soya-bean Co-ordination Report Part 1, 1977/1978 Season. Mount Makulu Central Research Station, 1978.

## **1.3 Oral Interviews**

Damaseke, M., Soil Chemist, Mount Makulu Central Research Station, 29th March, 2000.

Malikopo, R., Tree Crops Research Officer, Mount Makulu Central Research Station, 30th March, 2000.

Manda, T.H. E., Maize Breeder, Mount Makulu Central Research Station, 30th March, 2000.

Muchimba, S., Plant Pathologist, Mount Makulu Central Research Station, 28th March, 2000.

Mudenda, E. H.K., Former Plant Breeder at the Central Research Station, 1st Parliamentary Secretary in the Ministry of African Agriculture and former Minister of Agriculture, Lusaka, 15th November, 1999.

Mukuka, J., Entomologist, Mount Makulu Central Research Station, 31st March, 2000.

Mukutu, N., Former Extension Officer and Retired Permanent Secretary in the Ministry of Agriculture, Lusaka, 5th April, 2000.

Muliokela, S., (Former Seeds Officer), Director, Golden Valley Agricultural Research Trust (GART), GART, 5th April, 2000.

Munyinda, K, (Former Agricultural Chemist), Mount Makulu Central Research Station, Lecturer, School of Agricultural Sciences. University of Zambia (UNZA), 27 October, 1999.

Musonda, M.R.E., Senior Agricultural Research Officer and Head of Bio-control Section, Mount Makulu Central Research Station, 29th March, 2000.

Msiska, K.K., Agricultural Research Officer, Mount Makulu Central Research Station, 31st March, 2000.

Mtonga, B., Legumes Research Team Leader, Mount Makulu Central Research Station, 29<sup>th</sup> March, 2000.

Ndiyoi, M., Chief Agricultural Research Officer and Team Leader of the Adaptive Research Planning Team (ARPT), Mount Makulu Central Research Station, 8th November, 1999.

Siameja S. , Agricultural Research Officer, Mount Makulu Central Research Station, 7th April, 2000.

## 2. **Published Primary Sources.**

### 2.1 **Northern Rhodesia Government Documents.**

Northern Rhodesia Government (hereafter known as N.R.G.), *Colonial Research 1954-1955*. London: His Majesty's Stationery Office, 1955.

N.R.G., *Colonial Research 1953-1954*. London: His Majesty's Stationery Office, 1954.

N.R.G., Department of Agriculture, *Annual Reports, 1953 - 1963*. Lusaka: Government Printer.

N.R.G., *Legislative Council Debates - 3rd Session of the 8th Council, 30 November 1946 -12th February, 1947*. Lusaka: Government Printer, 1947.

N.R.G., *Ten Year Development Plan for Northern Rhodesia as approved by Legco on 11th February, 1947*. Lusaka: Government Printer, 1951.

N.R.G., *Advisory Commission on the Review of the Constitution of the Federation of Rhodesia and Nyasaland*. London: Her Majesty's Stationery Office, 1960.

N.R.G., *Pim Commission: Report of the Commission Appointed to Inquire into the Financial and Economic Position of Northern Rhodesia*. London: His Majesty's Stationery Office, 1938.

N.R.G., *Report of the Committee Appointed to Inquire into Development of the European Farming Industry*, 16th May, 1946.

Clay, C.F., *Northern Rhodesian Memorandum on Post-war Development Planning*, Lusaka: Government Printer, 1945.

Lewin, C.J., *Agriculture and Forestry Development Plans for Ten Years*, Lusaka: Government Printer, 1945.

## 2.2 Government of Zambia Documents

Government of the Republic of Zambia (hereafter known as GRZ), Ministry of Agriculture, *Annual Reports of the Research Branch, 1964-1980*.

G.R.Z., *First National Development Plan 1966-1970*. Lusaka: Office of National Planning and Development, 1966.

G.R.Z., *Second National Development Plan 1972-1976*. Lusaka: Ministry of Development Planning and National Guidance, 1971.

G.R.Z., *Third National Development Plan 1979-1983*. Lusaka: Office of the President - National Commission for Development Planning, 1979.

G.R.Z., Ministry of Agriculture, *Annual Reports of the Extension Branch, 1970-1980*.

G.R.Z., Ministry of Rural Development, *Tenth Anniversary Yearbook*. Lusaka: Government Printer, 1974.

G.R.Z., *Zambia's Plan at Work, 1966-1970*. Lusaka: Office of National Development and Planning, n.d.

G.R.Z., Ministry of Agriculture, *National Research Action Plan*: Lusaka: Research Branch, 1991.

G.R.Z., The United Nations in Zambia, *Report: Prospects for Sustainable Human Development in Zambia - More Choices for Our People*, 1996.

### 2.3 Newspapers

*The Livingstone Mail.*

*Mutende*

*The Times of Zambia.*

*The Zambia Daily Mail.*

## 3. SECONDARY SOURCES

### 3.1 Books

Anthony, Kenneth M. and Uchendu, Victor C., *Agricultural Change in Mazabuka District, Zambia*. Los Angeles: Food Research Institute, 1970.

Baldwin, E.R., *Economic Development and Export Growth: A Study of Northern Rhodesia, 1920-1960*. London: Cambridge University Press, 1966.

Bancroft, J.A., *Mining in Northern Rhodesia*. Bedford: Sidney Press, 1961.

Barber, William J, *The Economy of British Central Africa*. London: Oxford University Press, 1961.

Bates, Robert H., *Rural Responses to Industrialization*. London: Yale University Press, 1976.

Chipungu, Samuel N., *The State, Technology and Peasant Differentiation in Zambia: A Case Study of the Southern Province, 1930-1986*. Lusaka: Historical Association of Zambia, 1988.

Dodge, Doris J., *Agricultural Policy and Performance in Zambia*. Los Angeles: University of California, 1977.

Gann, L.H., *A History of Northern Rhodesia: Early Days to 1953*. London: Chatto and Windus, 1964.

Gumbo, Moses, *Maize Agronomy in Zambia, 1914-1918*. Lusaka: Research Branch, 1986.

Hellen, John A., *Rural Economic Development in Zambia, 1890-1964*. London: C. Hurst and Company, 1968.

Howard, J. A., Chitalu, G.M. and Kalonge S.M. *The Impact of Investments in Maize Research and Dissemination in Zambia*. Michigan: Michigan State University, 1973.

Kean, Stuart A. and Singogo, Lingston P., *Ofor Case Study No. 7 Zambia's Organization and Management of the Adaptive Research Planning Team*. Lusaka: Research Branch, 1988.

Lombard, C. S. and Tweedie, A.H.C., *Agriculture in Zambia since Independence*. Lusaka: National Education Company of Zambia, 1972.

Makings, S.M., *Agricultural Change in Northern Rhodesia, 1945 - 1965*. Los Angeles: Food Research Institute, 1966.

Makings, S.M., *Agricultural Problems of Developing Countries*. London: Oxford University Press, 1967.

### 3.2 Articles and Chapters in Books

Ahmed, F., 'Biological Control of Plant Pests in Zambia', *Farming in Zambia*, 10,3(1976), 12-13.

Ballantyne, A.O., 'Agricultural Research in Zambia', *Farming in Zambia*, 1,2 (1966), 11-12.

Ballantyne, A.O., 'Research is Vital to the Process of Agriculture', *Farming in Zambia*, 1,5 (1966), 5-6.

Carstairs, C.Y., 'Colonial Research', *African Affairs*, 44, 174 (1945), 19-26.

Chondoka, Yizenge A., 'Government Technical Assistance to African Farmers in Mazabuka District, 1924-1954', *Zambian Land and Labour Studies*, 4 (1981), 32-43.

Commercial Farmers' Bureau, 'Mount Makulu Central Research Station', *Productive Farming* 127 (1984), 11-12.

Cruikshanks, Keir, Slater, Claude and Hatakwati, Paul, 'Research to Produce Beef in Zambia at the Central Research Station, Mazabuka', *Farming in Zambia*, 3,4 (1968), 6-9.

Crunfurd, R.Q., 'Review of the More Important Reports and Papers in Mount Makulu Library', Research Memorandum no. 28, *Ecology and Pasture Research in Zambia (1933-1979)*. Lusaka: Mount Makulu Central Research Station, (1979).

Eylands, Vaj J. and Patel, Bharati K. 'Agricultural Research', in Wood, Adrian Paul, Kean, Stuart A, Milimo, John J. and Warren, Dennis Michael (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*. Iowa: Iowa University Press, 1990, 307-320.

Gray, David H, 'The Seeds Act and the Farmer', *Farming in Zambia*, 3,4 (1969), 12-13

Kean, Stuart A., Singogo, Lingston P. and Sutherland, Alistair J. 'The Adaptive Research Planning Team', in Wood, Adrian P. et al (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*, 1990, 321-341.

Klepper, Robert, 'Zambian Agricultural Structure and Performance', in Turok, Ben (ed.), *Development in Zambia*. London: Zed Press, (1979) 134-148.

Lof, Gerard and Mulele, Rusell M., 'The Changing role of the Extension Service', in Wood Adrian P. et al (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*, 1990, 342-353.

Lukanty, Jadwiga and Wood, Adrian Paul , 'Agricultural Policy in the Colonial Period', in Wood, Adrian Paul et al (eds.), *The Dynamics of Agricultural Policy and Reform in Zambia*, 1990, 3-19.

Mc Phillips, J. K., 'Soil Testing-An aid to the Farmer', *Farming in Zambia*, 1, 3 (1966), 10-11.

Mingochi, D.S., 'Review of the Status of Vegetable Research in Zambia', in *Vegetable Research in Zambia*. Sanhua: Asia Vegetable Research and Development Centre, (1997), 7-12.

Mudenda, E.H. K., 'Foreword', *Zambian Review*, 2,3 (1964), 111-118.

Muntanga, Silas, 'Radio Farm Forum', *Farming in Zambia*, 4,2 (1969), 36-37.

Muntanga, Silas, 'Radio Farm Forums are a Success', *Farming in Zambia*, 3,2 (1968), 4-5.

Ndiyoi, M. and Phiri M., 'Institutionalization of the Farming Systems Approach in Zambia' in Anandajayasekeram, Ponniah and Stilwell, Ted (eds.), *Institutionalization of Farming Systems Approach in Eastern and Southern Africa*. Mbabane: The Southern African Association for Farming Systems Research-Extension, 1998.

Osei-Hwedie, Bertha Z., 'Food Crisis in Zambia' in Osei-Hwedie, Kwaku and Ndulo, Muna (eds.), *Issues in Zambian Development*. Kinshasa: Omenana Nyangwe, 1985, 113-128.

Peter, E., Watts R., Ngangula, Peter and Haas, A.W., 'Agricultural Communications', in Wood, Adrian P. et al (eds), *The Dynamics of Agricultural Policy and Reform in Zambia*. ✓

Roberts, R.A.J. and Elliot, Charles, 'Constraints in Agriculture', in Elliot, Charles (ed), *Constraints on the Economic Development of Zambia*. London: Oxford University Press, 1971.

Vaughan, Megan, 'Exploitation and Neglect: Rural Producers and the State in Malawi and Zambia', in Birmingham, David and Martin, Phillis (eds.), *History of Contemporary Africa: The Contemporary Years Since 1960*. New York: Addison Wesley Longman Ltd., 1998.

### 3.3 Unpublished Dissertations and Theses

Jones, Marilyn Y., 'The Politics of White Agrarian Settlement in Northern Rhodesia, 1898-1928'. M.A. Dissertation, University of Sussex, 1974.

Kanduza, A.M., 'Underdevelopment in Northern Rhodesia, 1918-1960: A Study of Customs Tariff, and Railway Freight Policies'. Ph.D. Thesis, University of Dalhousie, 1982.

Mwape, Bonard L., 'Zambia's Agricultural Policy and Performance, 1960 - 1980'. Ph.D Thesis, University of Pittsburg, 1984.

Mwila, Chungu, 'The Adoption of Improved Agricultural Technology On Farms in Zambia'. Ph.D. Thesis, University of Bradford, 1986.

Nkhata, Mcheleka C., 'Settlement Schemes and Labour Migration in Chipata District of Eastern Province of Zambia'. M.A. Dissertation, University of Zambia, 1987.

Siamwiza, Bennet S., 'Hunger in the Gwembe Valley: A Case Study of Mweemba Chieftaincy, 1905-1987'. M.A. Dissertation, University of Zambia, 1993. ✓