Intsormil

TRIP REPORT

BOTSWANA

by

MAX CLEGG
UNIVERSITY OF NEBRASKA

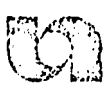
FEBRUARY 6-12, 1983

CONTRACT NO.: AID/DSAN/XII-G-0149

☆ International Sorghum/Millet

☆ Collaborative Research Support Program (CRSP)

A Research Development Program of the Agency for International Development, Participating Land-Grant Universities, Host County Research Agencies and Private Donors.



Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln

INTSORMIL SORGHUM PROGRAM
BOTSWANA TECHNICAL REPORT

Max D. Clegg

February 6-12, 1983

ACKNOWLEDGEMENTS

I would like to acknowledge the excellant co-operation of everyone that I visited.

Special thanks are due to Mr. L. Gakale and Drs. D. Gollifer and D. Norman who provided assistance, transport, etc., which made my stay enjoyable.

INDEX

1.0 CONCLUSIONS AND RECOMMENDATIONS.

1.1 Moisture is a major constraint for crop production because of the dependence of rainfall during the growing season. Little or no water is stored in the soil during the winter months (3.1).

1.2 Crop production methods range from the more traditional to modern. However, common to all methods are several plantings which may continue through January depending upon rainfall. Therefore, testing of new varieties should include as several procedure several plantins dates to insure adaptability. This also should apply to weed control and to new improved production schemes (3.2).

1.3 Initial results of cereal-legume rotation studies suggest that on low fertility soils establishment of higher fertility (nitrogen) will occur in a relative short period. These studies should be continued. Higher fertility will aid in water use efficiency and expression of higher yields of improved varities (4.0).

1.4 An important and lacking step in research programs is farmer contact. The Agricultural Technological Improvement Project (ATIP) and others provide this important link. Agronomist, plant breeders, entomologists, pathologists, ect. should make recommendations based on their research for these groups to use (5.0).

1.5 Mr. Louis Mazahni will be returning in May as a sorghum breeder. The Department of Agricultural Research has requested a consulting plant breeder to assist in setting up the breeding program. Dr. Bill Ross would be and excellant candidate (6.0).

1.6 A cereal agronomist position has been approved. The agronomist should become familiar with the existing research and farming systems projects. His project should be directed towards relevant crop production research with the objective of making recommendations which can be used by the farming systems groups (7.0).

1.7 An agronomist (M.Sc.) is being requested to continue cereal-legume research to improve soil fertility. This is a very important area and I recommend that this position be established (8.0).

2.0 INTRODUCTION:

This report is based on a trip to Botswana from February 6-12, 1983. Nebraska Project 13 is involved with cropping systems especially the benefitial role legumes play in increasing soil fertility. The objectives of the trip were to:

2.1 Evaluate the progress of the legume-sorghum rotation and intercropping research of Mr. Lucas Gakale. He will be using some of this data towards his Ph.D.

2.2 Observe crops growing in the fields and assess problem needs.

2.3 Meet with various program scientists involved with sorghum research.

2.4 Explore the co-opeative role of INTSORMIL for supporting research with junior scientists to aid existing programs while their scientists are obtaining advanced studies. Also, methods of support for returning scientists.

3.0 OBSERVATIONS.

3.1 GENERAL.

Crop production is mainly in Eastern Botswana. It depends on rainfall which occurrs throughout the season. Seasonal rainfall may start at anytime beginning in November through December. Essentially no rain occurrs during the winter months from May through October. Usually if the rains start early there is a good probability for a good season. Local rainfall may also vary considerably. Farmers plant beginning with the start of the rains and may plant up through the middle of February.

Rainfall started early November and there was every indication that it would be a good year. However, for the most part the last rains occurred around the first of December and has resulted in in severe drought. In many areas farmers had abandoned crop culture either entirely or certain plantings.

3.2 CROP PRODUCTION.

Crops observed growing were maize, sorghum, cowpeas, groundnuts, Juso beans, and mellons.

Crop production in the Lobatse area is fairly modern. This area has deep soils and a rainfall of 500 to 550 mm. Maize is the dominant cereal. Sorghum, groundnuts and cowpeas are also grown. A two meter row-spacing is used. Weed control is by disking between the rows. The main weed problem is with weeds in the crop row. Several planting dates may be used beginning with the first rains. According to the farmer whose farm we visited cowpeas would be planted in late February.

The influence of soil types on sorghum growth was observed on three experimental sites established by Dr. P. Stewart-Jones (Mobile Lab) to study sorghums response to phosphorous. The sites were in the Gabarone area located within approximately 10 Km of each other and had soils which were either sandy, medium (loamy), or heavy (clayey). This variation is typical for Botswana. Some of the sandy soils become very hard when dry and need sufficient rain before any tillage can be performed. Sufficient amounts and distribution of rainfall had occurred in November to fill the soil profiles of even the heaviest soils. The sorghum was reflecting the moisture holding capacity of the soils. The sorghum on the sandy soil was stressed from drought, whereas, the sorghum on

the heavier soils had very little stress, especially if the soil fertility had been improved.

Crop production in the Mahalapy area is more traditional with small farms and draft power. This area has an annual rainfall of 400-450 mm. The crops observed growing were sorghum, cowpeas, Jugo beans and mellons. The crop seed, usually a mixture of cereal, legume and mellons, is broadcast and plowed in. Some farmers may plow, broadcast and harrow the seed in. Stands are variable with respect to density and ratio of crops. This reflects the seeding system and moisture conditions at plantins. The legume and cereal distribution in the mixed crops fields probably represent a "random" rotation and maintian a fairly adequate nitrogen level. Plantings occur as long as the soil is workable and continues with successive rainfall until the entire farm if possible is planted. This results in a series of different planting dates, any which may result in the highest yield for that season.

4.0 CEREAL-LEGUME RESEARCH.

Research using sorghum and legumes in rotation or sequence was established in 1981-82 (Appendix A). This research addresses the area of soil fertility that is within the grasp of the small farmer who usually does not use fertilizer. Increasing soil fertiity is very important because good fertility improves the water use efficiency of crops and also is required for improved varieties to express maximum yields. Three experiments are in progress on the Sebele Experiment Station and one on the Goodhope Experiment Station. By February of the second season (1983), there was an obviously visual affect of better sorghum growth following cowpeas in the rotation study at Sebele. There was also good visual growth of sorghum when grown after cowpeas and groundnuts in the sequence study. In both experiments nitrogen applied to sorghum resulted in good sorghum growth. Probably the most spectacular sorghum response after a legume was at Goodhope. Exceptionally good plant stands were obtained after groundnuts as well as better sorghum growth. The responses observed one year after establishing the rotations are exciting because it suggests that on these low nitrogen soils establishment of a higher fertility level in a short period is possible.

5.0 FARMING SYSTEMS RESEARCH (ATIP).

The objectives of Agricultural Technology Improvement Project (ATIP) are outlined in the December 1982 workplan (Appendix B). A team is located at Mahalapye and another

will be located at Francistown. At Mahalapye on farm trials have been established. This is the link that past research programs have lacked, an actual contact with the farmer. This project takes research recommendations for crop production practices, varieties and improved technology which have a high probability of success and tests them in comparison with the farmer practices. One of their constraints is that there is not a good data base of production practices, etc. to use in their on farm trials. Therefore, close contact is needed between the cereal and legume agronomist, the plant breeder, the soil fertility scientist, entomologist, plant pathologist, etc..

6.0 PLANT BREEDING.

At present there is not a cereal plant breeder in the Department of Agricultural Research (DAR) This position will be filled by Mr. L. Mazahani upon completion of his M.Sc. at the University of Nebraska this May. Upon his return, DAR would like a consulting plant breeder to spend from 2 to 6 weeks in Botswana to aid in setting up a sorghum breeding program prior to the 1983 planting season.

7.0 CEREAL AGRONOMIST.

This position was approved by USAID/Botswana. Attached are the recommendations by the Department of Agricultural Research, Botswana for the job description (Appendix C).

The person in this position has the opportunity to conduct research and provide a data base from which recommendation can be made and verified by the various farming systems groups (ATIP, EFSAIP, ADN, IFPP) in Botswana. Even though there is considerable research being conducted with sorghum, there has been little effort to summarize for verification testing. This person should become very familiar with these different groups. There is the opportunity to conduct various experiments in a co-operative manner. However, they do not want to conduct these experiments, but want the best treatment, variety, cultural practice, etc. to introduce and compare with the traditional systems.

8.0 AGRONOMIST (M.Sc.).

This position has been proposed to continue the DAR project "Cereal-legume Systems of Improving Soil Fertility" (Appendix D). Legumes are known for their nitrogen fixation abilities which benifits soil fertility. This project addresses the problem of

furnishing nitrogen with a cereal-legume system which is applicable to the small farm. Mr. Lucas Gakale has been scheduled to leave in May 1983 for the U.S.A. to complete his Ph.D. studies at the University of Nebraska. This scientist would maintain the legume studies in progress and work closely with the plant breeder and the cereal and grain legume agronomists in developing varieties for cereal-legume cropping. This person may also aid the Farming Systems Project in adapting rotation or intercropping of sorghum and legumes to improve soil fertiltiy on the farms which generally do not use fertilizer.

DEPARTMENT OF AGRICULTURAL RESEARCH - FIELD DAY, 1982

Crop Rotation and Nitrogen Nutrition Studies

Introduction

Traditional farming practices entail the planting of crops in mixtures, often a cereal and legumes are included in such mixtures. The practices seem to have enabled reasonable yields even without any fertilizers. Modern farming practices call for row cropping in monocrop planting patterns. This eliminates crop mixtures (except in as yet unresearched intercropping situations) thereby increasing chances of crop failure due to impoversishment of the soil in monocropping situations. Appropriate cereal - legume rotation sequences offers opportunities of maintaining reasonable yields of cereal crops under low native fertility regimes especially in the 'small farmer' situations where fertilizers are usually not used. The experiments under this section examine the possibility of exploiting the legume nitrogen fixing ability to satisfy the nitrogen needs of a succeeding sorghum crop.

The Projects

The projects under study have the following main objectives:-

1) Determine the yield response of sorghum following cowpeas or groundnuts compared to continuous sorghum with and without fertilizer nitrogen.

2) To monitor seasonal soil mineral nitrogen (mainly post harvest and preplanting) and try to relate this to crop response.

3) To try to work out the minimum fertilizer rate - legume combination that will give the yield of the cereal crop.

4) To measure the plant N-uptake (cereal) during the life of the crop - vegetative, flowering and physiological maturity stages.

To achieve these objectives four field experiments have been initiated during the current cropping season:-

2/....

At Sebele

i) Sorghum - cowpea rotation study on 2 soil types, a sandy soil (Block 8) and a sandy loam soil (B 33) at 0, 20, 40 and 60 kg ha^{-1} N as LAN (28% N) applied to the sorghum crop only.

ii) A three crop sequence - sorghum, cowpeas and groundnuts to be followed by sorghum the next season at, 0, 20 and 40 kg ha^{-1} N (Block 8).

iii) A straight fertilizer NP factorial experiment with four levels of N (0, 20, 40 and 60 kg ha^{-1} N) and three levels of P (0, 20 and 40 kg ha^{-1}P).

At Goodhope.

iv) Same as i) above but with groundnuts substituting for cowpeas.

Field plans for the 2 experiments are attached for guidance.

Appendix B

66/1

AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)

ANNUAL WORK PLAN

December 1982

AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)
ANNUAL WORK PLAN
December 1982*

1. PURPOSE OF PROJECT:

1.1 To improve the capacity of the MOA's research and extension programs to develop and effectively extend farming system recommendations relevant to the needs of the small farmer.

1.2 In the project design it was envisaged that ATIP would contribute to this purpose in three ways:

1.2.1 Help strengthen the experiment station based research of the Department of Agricultural Research (DAR) and strengthen the links between such research and farmers by implementing a Farming Systems Approach to Research (FSAR), with teams based at Mahalapye and Francistown.

1.2.2 Help strengthen the linkage between research workers (in DAR) and extension personnel (in the Department of Agricultural Field Services (DAFS)) through the appointment of a Research Extension Liaison Officer (RELO).

1.2.3 Help set up a commercial seed production system to ensure that adequate supplies of needed seed are available for distribution to Batswana farmers.

1.3 In terms of the above, the work plan until September 1983 includes consideration of 1.2.1 and 1.2.2. No work plan for 1.2.3 has been proposed due to postponement of this program as a result of discussions between USAID/Botswana (USAID/B) and the Government of Botswana (GOB).

2. THE FSAR COMPONENT (Item 1.2.1 above):

2.1 Preamble:

2.1.1 A number of attributes of FSR helped focus the direction of the work plan. Since there is a great deal of confusion as to what is called Farming Systems Research (FSR), a conceptual outline of the ATIP approach is given in Figure 1. ATIP researchers prefer to call it a Farming Systems Approach to Research (FSAR). ATIP's FSAR program is aimed at improving the welfare of farming families through increasing their productivity. Two complementary approaches can be followed:

a) Farming Systems Research (FSR) - involving the development of relevant improved technologies and their dissemination via the extension service.

b) Farming Systems Perspective (FSP) - involving influencing the development of relevant policies and support systems.

2.1.2 Initially ATIP's emphasis is to be mainly on FSR although hopefully later in the project increasing emphasis will be placed on FSP.

*The Annual Work Plan is scheduled to be produced in September each year but was late because of delays in implementation of the contract and late arrivals of TA personnel.

2.1.3 ATIP researchers believe a successful FSR program must include involving the farmer (the consumer of the improved technologies); tapping the pool of knowledge of farmers; recognising the heterogeneous nature of the farming community; using an interdisciplinary approach; exploiting complementary and supplementary relationships in the farming system; and having a dynamic and iterative research approach which is complementary with experiment station based research.

2.2 Work Plan:

2.2.1 Strengthen experiment station based research.

Improving the strength of experiment station research is critical to the success of FSR. This is being facilitated by the following:

a) A Grain Legume Agronomist partially supported with funds from the Bean/Cowpea CRSP has been stationed at Sebele. Heavy emphasis on experiment station based work on cowpeas constitutes the major focal point during the current rainy season.

b) Attempts will be made to finalize plans for recruiting a Cereal Agronomist under the INTSORMIL CRSP in time for strengthening the experiment station based research next rainy season.

2.2.2 Commence work of the Mahalapye FSR team.

The work plan being implemented is illustrated in Figures 2 and 3. Specific points to be noted are as follows:

a) Because of the delays in finalizing the contract, the late arrival of TA personnel and logistical problems arising from housing not being ready in Mahalapye, two rather than three villages, as indicated in the Project Paper, are being focused on this coming year.

b) A village exploratory survey was undertaken in the two selected villages (Makwate and Shoshong) using two interdisciplinary teams. Each team consisted of at least one agronomist and one agricultural economist. Arising out of the exploratory survey, recommendation domains were tentatively defined. These recommendation domains were based on factors affecting farming families' abilities to implement timely planting operations (a critical determinant of crop yields). Timeliness primarily is influenced by whether owned, hired or borrowed draught power (tractors, oxen, donkeys) is used by farmers.

c) A sample frame survey in the two villages was undertaken with the help of enumerators provided by the Central Statistics Office. This survey provided an empirical idea on the representation of farming families in each of the recommendation domains (strata).

d) Using the results of the sample frame survey, a proportional sample of farming families in each recommendation domain was selected to participate in socio-economic case studies (Case Study Farmers--28 in

14

total) and on-farm trials (Trial Farmers--24 in total). In selecting these samples, special care was taken to obtain proportional representation of male and female headed households. The information from the Case Study and Trial farmers will be supplemented and complemented by Special Subject surveys and Field Observation surveys that will, depending on their objectives, have different samples.

e) Heavy emphasis during this coming year will be placed on the Descriptive/Diagnostic stage to provide an in-depth understanding of the technical and human environment in which farming families operate. Such understanding will be facilitated through the multiple-visit Case Study of farming families focusing on the resource flows and enterprise combinations of the household; the Special Subject (often one shot) surveys addressing specific technical, socio-economic, institutional and behavioral issues; and the Field Observation work (yellow and white peg studies).

f) In terms of the Design Stage, major reliance will be placed on results emanating from experiment station based research. However, where there is reason to expect "abnormal" conditions on the experiment station such as weed and pest complexes, soil conditions, differences in location, etc., there is a role for trials (RM, FI) on farmers' fields. It is not anticipated that this type of work will be a major component of ATIP's research program. Currently, plans are to "borrow" a small area of land from a farmer in Shoshong on which sorghum under-sown with different types of forage will be investigated.

g) With reference to the Testing Stage, some emphasis is to be placed on testing with the Trial Farmers (RM, FI). Primary emphasis is placed on measures contributing to seedling emergence. Poor emergence and the resulting poor erratic plant stand establishment are observed to be major factors leading to low grain yields per hectare in many years in Botswana. Different planting methods (red peg study), including the use of the plough planter and the row planter (developed by EFSAIP), are being evaluated for their effect on emergence. Seed placement in the soil differs with the various planting methods and this may be critical at certain soil moisture levels. These methods plus hand third furrow planting and harrowing after planting are each being compared with the traditional seed broadcast followed by ploughing traditional method. Other areas to be looked at will be superimposed trials (also RM, FI) looking at the influence of seed size on emergence.

h) In order to assess the representativeness of the two selected villages, an exploratory survey followed by a one-shot verification survey will be carried out in other villages in the Mahalapye/Palapye area. This will also help in selecting the third village which will be added as a focal point in mid 1983.

2.2.3 Training of Batswana in FSAR-type activities is a critical component in institutionalizing FSAR activities

in Botswana. Two types of formal training programs are envisioned:

a) Short non-degree training courses. Two of the counterparts have already been to the CIMMYT-FSR course while a third one will be going in February.

b) Long term degree training course. It is planned to send two persons for degree training from DAR - one in January and the other in August. In addition, another two will be sent at similar times from DPS.

2.2.4 Short-term consultants will play an important role in the initiation of the project. The following have been or will be involved:

a) Dr. J. Sjo (Agricultural Economist and professional backstopper at KSU) in September familiarized himself with Botswana and ATIP, and helped fill in the period prior to the arrival of Mr. Doyle Baker in October.

b) Dr. M. Collinson (CIMMYT, Nairobi) in October gave valuable advice on the methodological aspects of FSAR.

c) Mr. C. Lightfoot (formerly of EFSAIP) in November helped guide the FSAR activities of ATIP.

d) Dr. J. Jorns (Campus Coordinator at KSU) in November familiarized himself with Botswana and ATIP and helped resolve many detailed administrative issues.

e) Dr. A. Barnaby (Agricultural Economist at KSU) will visit in March to help set up an efficient data processing and analysis system for the recently acquired micro-computer.

3. THE RESEARCH EXTENSION LINKAGE COMPONENT (Item 1.2.2 above):

3.1 Preamble:

The RELO position with respect to crops is a new one in DAFS. As a result it is as yet difficult to predict how the work plan will develop. Therefore, the following work plan should be considered incomplete and very tentative in nature.

3.2 Work Plan:

3.2.1 Activities of the RELO will include the following:

a) Much time will be spent over the coming months visiting various RAO's and DAO's to obtain knowledge about the extension service and the problems faced by farmers as perceived by extension personnel.

b) Attend some district level meetings.

c) Obtain knowledge about development activities in the country through liaising with ALDEP.

d) Develop familiarity with the research activities and programs in DAR.

e) Help in cooperation with the various FSR-type projects in DAR to develop productive relationships and information-exchange systems with DAFS personnel.

f) Continue close liaison with the activities of other ATIP personnel in the Mahalapye area.

g) Plan an improved or expanded refresher program in crop production, including agricultural mechanization.

h) Investigate potential interest in refresher in-service training courses for extension personnel.

3.2.2 In terms of formal training for Batswana, two DAFS individuals will be sent for degree training - one in January and the other in August.

4. ADMINISTRATION:

Substantial administrative duties on the part of the Team Leader and the Deputy Team Leader will continue to occupy a great deal of their time, with planning the expansion of ATIP to Francistown and improving the efficiency of administering the rest of the project in cooperation with GOB, USAID/B and MIAC.

FIGURE 1

F S A R

Key: R = researcher
F = farmer
M = managed
I = implemented

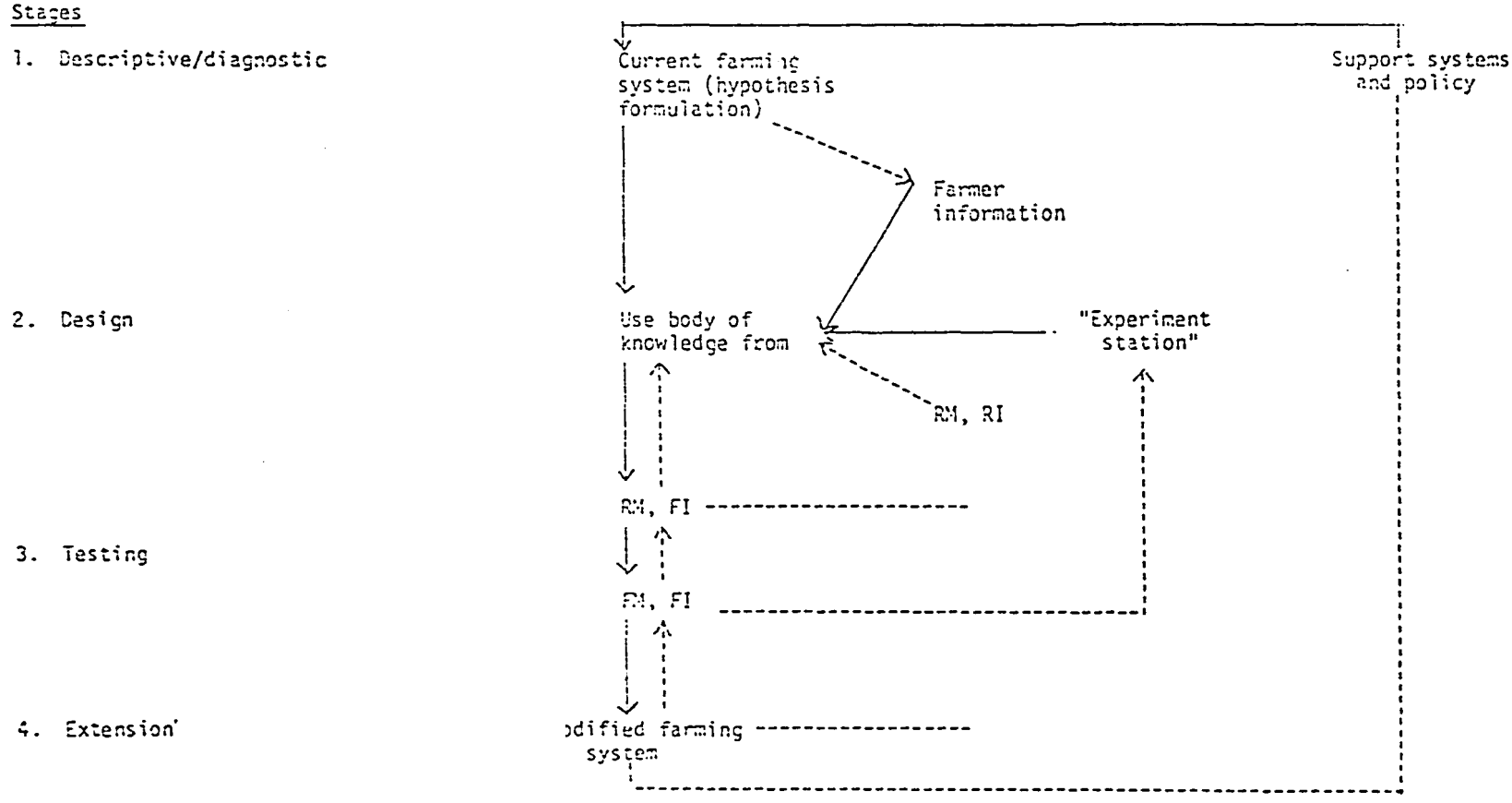


FIGURE 2

WORK IN PROGRESS

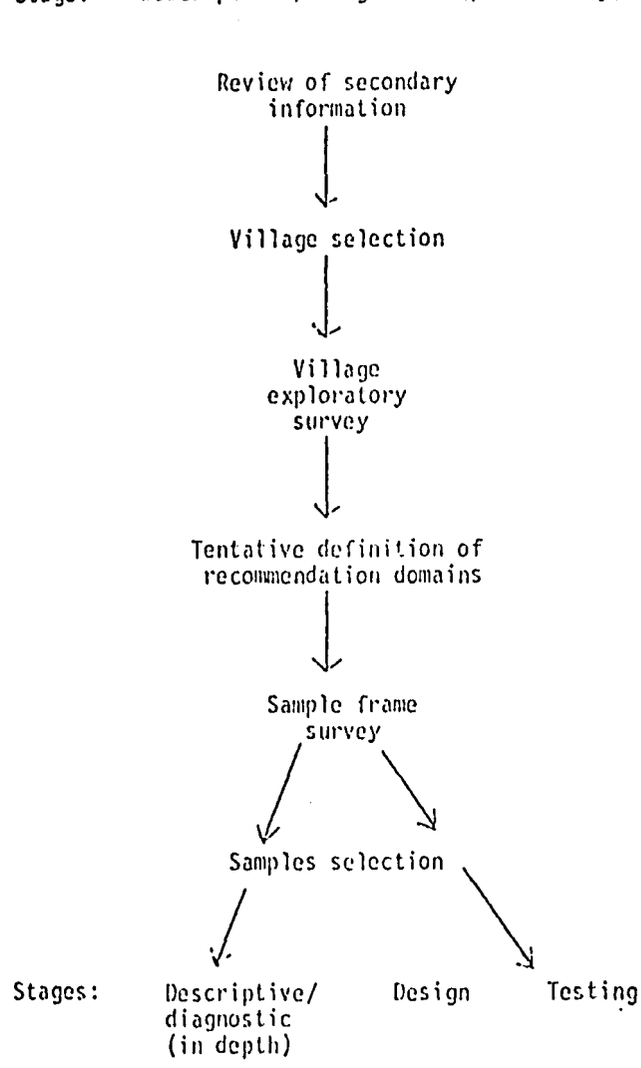
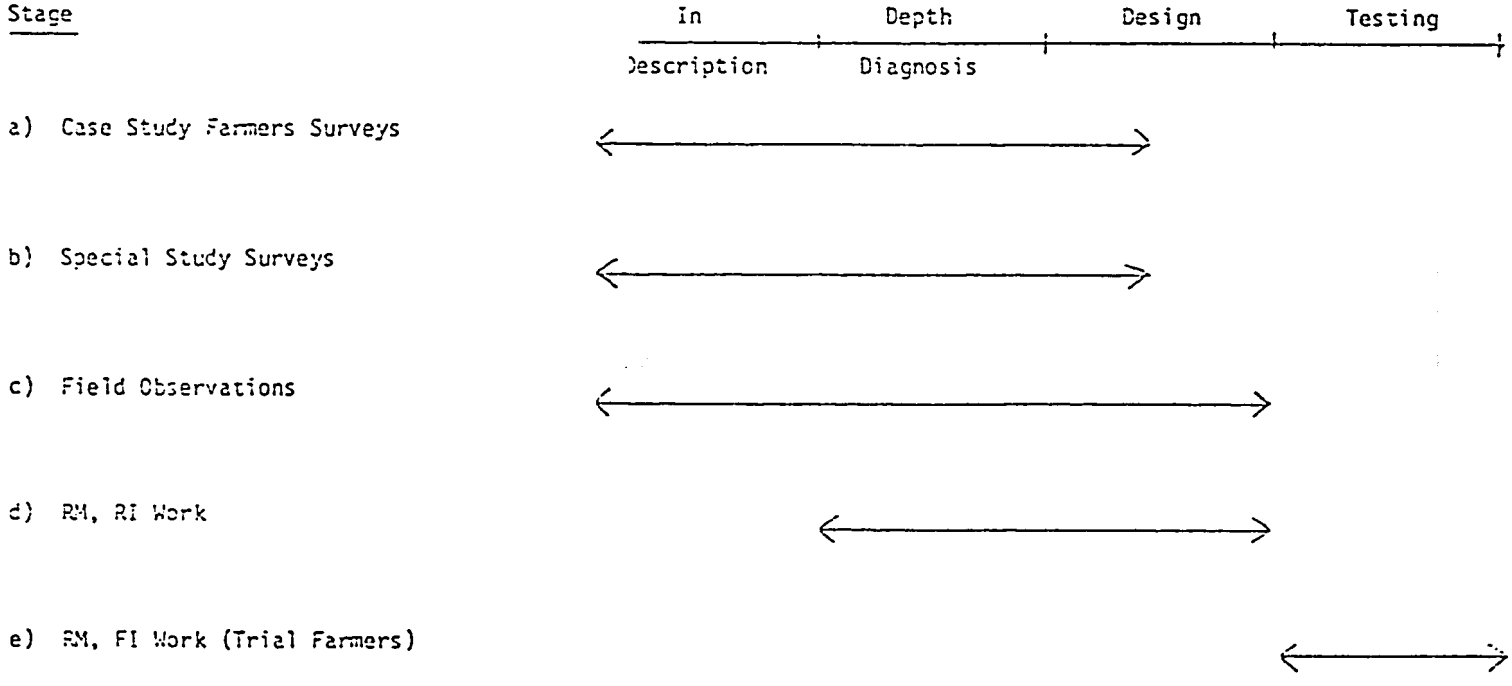


FIGURE 3

WORK PLANNED



JOB DESCRIPTION FOR CEREAL AGRONOMIST - DEPARTMENT OF AGRICULTURAL RESEARCH

Duty Station Sebele or Mahalapye (if housing and facilities are available).

Background

The Agriculture Technology Improvement Project ATIP (633 - 0221) includes the position of Cereal Agronomist (Annex II D p. 10) to strengthen the Department of Agricultural Research and support the Projects through relevant research findings.

DUTIES

The officer will undertake time of planting/variety trials with millet and sorghum as the test crops in Eastern Botswana. The trials will initially be planted at research stations and ultimately sites will be developed on farmers fields in collaboration with FSR projects.

The sorghum and millet varieties used will be those released from the Seed Multiplication Unit plus the better performers in the Crop Screening trials conducted by the Department of Agricultural Research. As material is made available from the ICRISAT/SADCC/millet/sorghum breeding programme to be based in Zimbabwe it will be incorporated into the experimental programme.

The test varieties should be exposed to as wide a variety of conditions as practically possible. These will include soil type, and site cropping history, with the treatments of plant population (two to three rather widely spaced population) in factorial combination with variety, management practice and fertilizer level (+/-P).

The cereal agronomist will be expected to closely monitor the test sites and help the sorghum breeding and crop Screening officers, identify those plant attributes contributing to the varietal specific responses observed.

Assistance will be given by the soil fertility, plant protection and agronomic disciples within the Department of Agricultural Research, on - the design and location of trials,and an experimental procedure.

QUALIFICATIONS

The officer should have a Ph.D. degree in Agronomy (cereals) or closely related disciplines and substantial overseas experience in developing countries.

JOB DESCRIPTION FOR AGRONOMIST - DEPARTMENT OF AGRICULTURAL RESEARCH

Duty Station Sebele

Background Mr.L. Gakale (Agricultural Research Officer) has initiated a series of crop rotation trials at Sebele and Goodhope research stations; the primary objectives of which are as follows:

i) Determine the yield response of sorghum following cowpeas or groundnuts compared to continuous sorghum with and without fertilizer nitrogen.

ii) To monitor seasonal soil mineral nitrogen (mainly post harvest and preplanting) and to try to relate this to crop response.

iii) To try to determine the minium fertilizer rate-legume combination that will give the optimum yield of the cereal crop.

iv) To measure the plant N - uptake (cereal) during the life of the crop - vegetative flowering and physiological maturity stages.

v) To determine the yield advantages or otherwise of intercrops versus monocrops.

Mr. Gakale is scheduled to leave for the U.S.A. during mid 1983 to complete his Ph.D studies on the above theme at the University of Nebraska. It is imperative that the rotational work initiated by Mr. Gakale continues during his absence as it is only after 4 - 5 years that clear trends in such a study can be detected; and the study should ideally be continued for at least up to 10 years.

It is therefore recommended that the Department of Agricultural Research recruits an agronomist under the auspices of INTSORMIL to continue this important rotational work.

Duties The officer will continue the four experiments at Sebele and Goodhope as initiated by Mr. Gakale and take all the necessary measurements of plant growth and yield and of soil N and plant -N uptake during the life of the cereal crop. In addition the officer may be requested to conduct crop rotation trials on selected sites in South East Botswana, in farmers fields, in collaboration with FSR projects.

Justification:

The information obtained from long term studies on crop rotations will be of great value to the Farming systems Projects in Botswana (ATIP, LFSAIP, ADN, IFPP) who will test the findings before general recommendations can be released to the Department of Agricultural Field Services, for extension to farmers.

Qualifications: The officer should have at least an M.Sc. in Agronomy/plant nutrition with some overseas experience in developing countries.

PROGRAMME FOR THE VISIT OF DR, MAX CLEGG OF THE UNIVERSITY OF NEBRASKA TO BOTSWANA FEB 6 - FEB 12, 1983

Sunday 6th Feb.	Arrival at Airport L. Gakale to meet.
Monday 7th Feb.	
08.0 0	Meeting in D.A.R.'S office
	Proposed INTSORMIL research support for Botswana (M. Jones, P. Brown, D. Norman, W. Stewart Jones, L. Gakale, G. Kennessy, C. Mantho, B. Motalaote, D. Collifer, C. Mmolawa to attend).
09.00	General tour of the station
09.00	Discuss progress rade in dissertation work. Visit trials on the station.
14.00	DLPRS Dr. M. Jones
15.00	CRSP Cowpea improvement programme Dr. DeKooy
16.00	ATIP Dr. Norman
Tuesday 8th Feb.	
08.00	Visit to Goodhope out-station. Visit a farmer in Barolong area C. Manthe
Wed. 9th Feb.	
06.30	Visit to Mahalapye and ATIP farmers trials. D. Norman and L. Modiakgotla to arrange.
Thursday 10th	
08.00	The Mobile Unit Dr. Steward-Jones
09.00	General discussion of dissertion work.
10.00	AID Mission Director
Friday 11th	General Discussion dissertation work
Saturday 12th	Departure.