

Malawi Agricultural Research Project

Center for Tropical Agriculture
International Programs
Institute of Food and Agricultural Sciences
University of Florida

The Department of Agricultural Research
Ministry of Agriculture, Malawi

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QUARTERLY REPORT

July, August, September, 1981

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Dee Baldwin, Library Consultant

Art Hansen, Farming Systems Analyst

E.M. Hodges, Pasture Agronomist

I.B. McLean, Horticulturist

D.E. McCloud, Professor and
and Chief of Party

/ /

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HIGHLIGHTS

Dr. McLean, Horticulturist arrived in Malawi on August 22, 1981. He is stationed at the Bvumbwe Agricultural Research Station.

Training

At the end of the quarter the 10 trainees who are studying for PhD had completed 28% of the allocated project months under the contract, and the 3 MS trainees had completed 4% of the project total. Over-all the participant training was 12% completed, Fig 1.

Dr. Hansen held a very successful lecture on "Farming Systems Research: Theory and Practice in Malawi", and Dr. McCloud taught an intensive 5½ day course on Crop Yield Dynamics.

Research

Farming Systems research during the quarter was conducted in three areas Lilongwe, Phalombe and Liwonde. A multi-disciplinary team designed on-station and on-farm trials to test the fertilizer responsiveness of "local" maize.

Malawi has a large number of native plants which may be useful as forage for livestock. Native plants were collected from the Northern Region for testing for their potential as forages.

The first research journal manuscript from the Agricultural Research Project was published during the quarter; it provides valuable guidance for Malawi peanut breeders on the possibilities for improvement of the Chalimbana cultivar.

Travel and Meetings

Travel by the Technical Assistance staff is necessary to attend meetings, field days, conferences and conduct research. The vehicle mileage traveled by the team was Baldwin 293,

Hansen 3,147, Hodges 731, McCloud 3,739 and McLean 9 for a total of 7,910 or 17.2% of the total miles driven by the USAID vehicles.

Administration and Financial

A critical situation has developed resulting from the Malawi Government's failure to establish the posts called for in the Agricultural Research Contract. Repeated requests to establish these posts over the past year have produced no results. With the arrival of the new team members this situation is seriously hampering contract progress.

Commitments from the Local Account were K22,102.10 for this quarter, and K240,138.29 since the project began. The University of Florida - IFAS bank balance as of September 30, 1981 was K59,053.51.

Fig. 1 presents a summary of Malawi Agricultural Project Inputs.

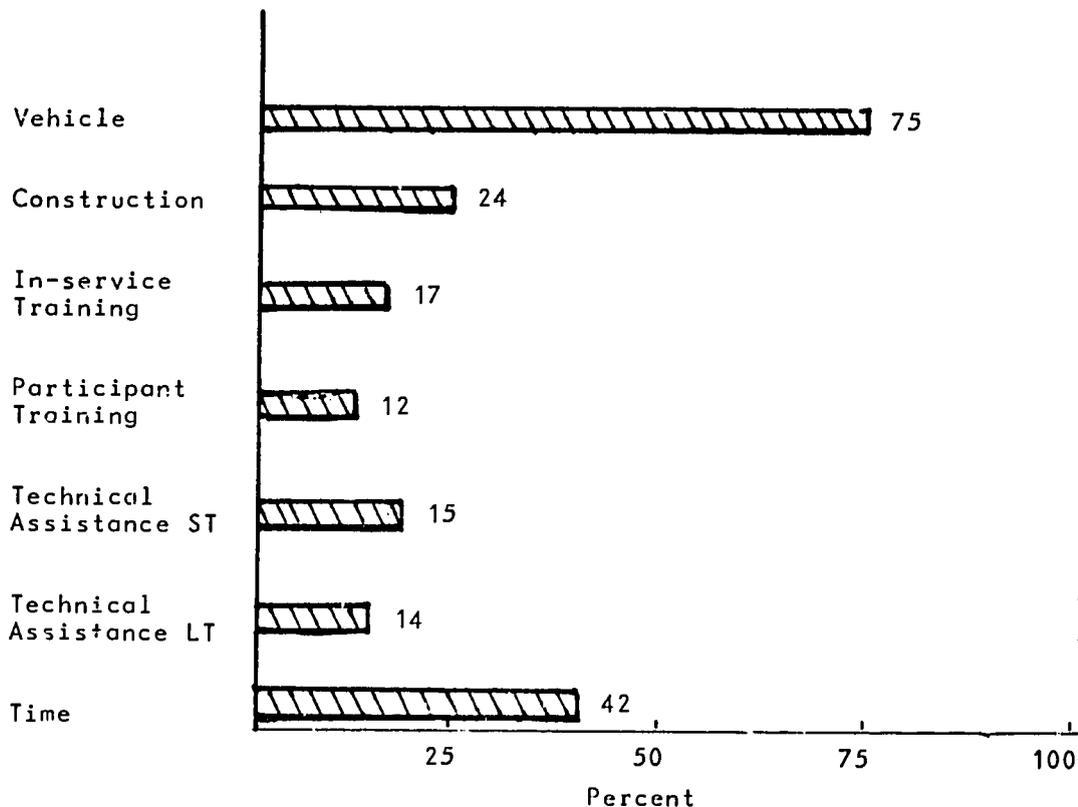


Fig. 1 Malawi Agricultural Research Project, Summary of Inputs to September 30, 1981.

Vehicles purchased include 6 land rovers, 4 station wagons and 10 motor cycles.

Construction is nearly complete at most stations except Chitedze.

In-service Training some 16 persons sent to various short courses and conferences.

Participant Training some 12 persons sent for the PhD and 6 for MS degrees.

Short-term Technical Assistance 6 persons brought to Malawi on TDY.

Long-term Technical Assistance all 7 of the long-term TA's now in Malawi.

Time is now 42% completed, since the first phase of the project ends August, 1984.

TRAINING

The project purpose is to strengthen the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in a form useable by the extension service. To achieve this purpose training of Malawian professional research personnel to the MS and PhD levels is an objectively verifiable indicator of progress.

Participant Training

At the end of the quarter the 10 trainees who are studying for PhD had completed 81 person months of training of a total of 288 for the project or 28% of the project total.

The 3 MS trainees had completed 27 person months of the 612 allocated for the project or 4% of the project total.

In-service Training

During the quarter there was no Malawians to attend international institute courses, conferences or workshops.

Farming Systems:

People received training in several ways and to varying degrees of intensity. The most intensive training will only begin when Malawian professional officers are finally assigned to the section. As yet there are none. Anticipating that he would be eventually hired (as he was in early November) Mr. Emmanuel Mwangi was taken to Balaka for the survey, where he received an intensive week's experience in farming systems research under the tutelage of Drs. Collinson and Hansen. Mr. Mwangi was also given books and other material to read.

Less intensive training in farming systems occurred in two ways: through actual participation with Dr. Hansen in his work in the various areas, and through lecture and conversation at the research stations. In September a public lecture was

given at Chitedze (a copy of the paper is attached, "FARMING SYSTEMS RESEARCH: THEORY AND PRACTICE IN MALAWI") to an audience of 75 people from various departments of the Ministry of Agriculture. The lecture will be repeated in other regions and at other research stations. Arrangements were also made to send two research staff to Nairobi for another CIMMYT course on farming systems research in October.

Physiology:

Taught a 5½ day intensive course in Crop Yield Dynamics to 10 students at the Bvumbwe Research Station. Five of the students are scheduled to leave for U.S. universities for training in 1981. The course served as an introduction to American University teaching in addition to providing useful in-service training.

RESEARCH

Research by the technical assistance team is an important project input. Three research areas: Farming Systems, Pastures and Physiology of peanut yields were underway during the quarter.

Farming System

Research during the quarter was carried out in three different areas of the country: rural Lilongwe of Lilongwe Agricultural Development Division (ADD), Phalombe of Blantyre ADD, and Balaka of Liwonde ADD. In the first two of these research activities concerned planning how best to investigate high priority topics that were noted during earlier Farming systems diagnostic surveys (in April and May respectively). In Balaka, however, a survey was conducted during the quarter (in September) to initiate the farming systems research process. No research was conducted in Chitipa or Karonga ADD (surveyed in June) because a continuing shortage of research staff necessitated a reduction in the geographical area that could be adequately covered.

For the rural Lilongwe area a multidisciplinary team at Chitedze Research Station (including Drs. McCloud and Hansen) designed on-station and on-farm trials to test the fertilizer responsiveness of "local" maizes (see attached report on "LADD LOCAL MAIZE TRIALS"), and LADD research staff decided to extend these trials to also include the Thiwi-Lifidzi and Ntcheu areas. An on-station trial will compare the nitrogen responsiveness on 23 samples of local maizes (with a composite variety as control) to determine the variability of responsiveness among the heterogeneous population called "local" maize. On-farm trials of individual samples will test for location and management as well as nitrogen and phosphorus. The samples of local maizes and of farmers for on-farm trials were chosen from a sub-sample of the households in the Lilongwe area being studied by the National Sample Survey of Agriculture (NSSA). Maize was purchased from this random sample of local farmers.

In addition to these trials which will be initiated during the 1981-82 rainy season, the farming systems research section is collaborating with two of the economics faculty of Chancellor College on a study of the patterns and processes of social, agricultural and economic change among rural Lilongwe households surveyed during 1966-1970 and another set surveyed during 1977-1978 has already been completed. Typologies of households are being described for each period, and hypotheses generated to discover the changes that have occurred within those households to test and extend the hypotheses generated from the comparison of cluster analyses.

Trials for Phalombe area were developed through a complex research and extension network mediated by Dr. Hansen. Research staff from Chitedze and Bvumbwe Research Stations (including Drs. McLean and Hansen) and Bunda College designed trials which were modified in discussions with management and staff (extension and evaluation) from Phalombe and the Blantyre ADD headquarters. To address the priorities of the majority of Phalombe smallholders, the trials focus on improving the yields of maize that is grown for home consumption in an intercropping context under smallholder management. Two varieties (CCC composite and local maizes) are compared under two levels of fertilizer while intercropped with cowpeas and sunflowers. In addition to designing these trials which will be run during the 1981-82 rains, an area within Phalombe was also selected during the patterns of change among local smallholders and the motivations and constraints to change.

In Balaka Dr. Hansen (and a prospective staff member in pre-service training) participated for a week in a farming systems diagnostic survey supervised by Dr. Mike Collinson of the East African Maize and Wheat (CIMMYT). Since the survey Dr. Hansen has helped plan some on-farm adaptive research for the ADD. There is a contradiction between cutting back on work at Chitipa and expanding into Balaka that needs to be explained. The ADD management initiated the Balaka survey under Dr. Collinson's direction. If the farming systems

section had not stepped in and taken an active part, the Liwonde ADD would have had a separate research program independent of the Department of Agricultural Research and the national farming systems program. Although the staffing shortage makes it impossible to stop in and provide some guidance en-route.. The ADD has been informed that full coverage and supervision will not be possible at present.

Pastures

Completed all forage harvest for 1980-81. Collected leucaena leaf for pelleting and feeding research. Conducted a 2-week indigenous forage plant collection in northern district under the direction of Mr. Harry Msiska. Obtained material for updating Malawi Pasture Handbook. Currently continuing preparation and planting of experimental grazing pastures. Staging replicated plots for 1981-82 harvesting cycle. Obtaining Cynodon entries from outside Malawi to evaluate in nursery with indigenous star grasses. Obtain leucaena seed from world collection for initial screening for forage or other uses. Securing equipment for processing harvested forage samples.

Physiology

During the quarter a new TRS-80 pocket computer which basic language was purchased with personal funds for Dr. McCloud to learn basic language programming. The TRS-80 was programmed for the PNUTS simulation model. Since the HP-85 uses basic language, it was easy to transform the PNUTS program develop for the TRS-80 to a program for the HP-85. This computer gives rapid simulation.. 2 complete growth analysis (150 days) can be calculated day by day on this computer in less than 3 minutes.

Publications;

D.E. McCloud, W.G. Duncan, R.L. McGraw, P.K. Sibale, K.T. Ingram, J. Dreyer, and I.S. Campbell. Physiological Basis for Increased Yield Potential in Peanuts, ICRISAT Proceedings of

the International Workshop on Groundnuts, 13-17 October, 1980. Patancheru, A.P., India. This publication provides valuable guidance for Malawi peanut breeders on the possibilities for improvement of the Chalimbana cultivar. This is the first publication from the Agricultural Research Project.

TRAVEL AND MEETINGS

Travel was required for the technical assistance staff to conduct their official duties for the Agricultural Research Project.

D.F. Baldwin

July 15 - To Bunda College to discuss the Library Proposal.

Art Hansen

July 9 - To Blantyre assist his wife in clearing customs.

July 24-26 - To Zomba to discuss farming systems research with the economics and social research faculty at Chancellor College, National Statistics Office on the Malawi Agricultural survey.

August 13-16 - To Phalombe and Zomba to follow through on the May farming systems survey.

August 25-27 - To Blantyre to present the report on the May farming systems survey in Phalombe

September 8-14 - To Liwonde to participate in a farming systems survey of the Balaka area.

E.M. Hodges

July 1-23 - Sick leave, annual leave, return to Malawi.

August 14 - With Malawi/Canadian Dairy Project Manager, Allen Wall, and Extension Animal Officer, H. Proverbs to proposed dairy site by Presidential residence; discussed irrigation and lucerne.

- August 14 - Inspect Dzalanyama Ranch pasture and range sites with Animal Project Manager, Jerry Adams and Art Hansen and Charles Matabwa.
- 31 - Visit Bvumbwe Research Station to make arrangements for bermudegrass introductions from South Africa.
- Sept. 1-5 - Attend SARCCUS subcommittee for veld and pasture and Cedara Agricultural College, Natal, Republic of South Africa and visit Estcourt Research Station and forage nursery, to attempt to obtain new bermudegrasses for Malawi.

D.E. McCloud

- July 15 - Attend the Tsangano Wheat Field Day, to observe the wheat plantings in this area, and to monitor the construction site at Tsangano.
- August 22-23 - To Blantyre and Bvumbwe to welcome the McLean's and to assist with their settling-in.
- August 24 - Visit the Kasinthula and Ngabu Research Stations to discuss agronomic research progress.
- August 31-September 7 - To teach a 5½ day intensive course on Crop Yield Dynamics, at Bvumbwe.
- Sept. 18-19 - Traveled with Dr. Bill Judy, AID Washington, to the Makoka, Kasinthula and Bvumbwe Agricultural Research Stations to make on-site visits.

Vehicle Mileage

The total mileage driven by the USAID project vehicles during the quarter was 45,958 miles.

Table 1

Vehicle Peugeot	Location	During the Quarter	Total Miles
542D	Chitedze	1,560	12,532
716D	Chitedze	3,340	9,966
754D	Chitedze	4,127	9,752
715D	Bvumbwe	5,925	11,969
LandRover			
494D	Bvumbwe	2,750	9,354
689D	Lunyangwa	4,769	13,987
690D	Chitedze	3,632	17,993
692D	Chitedze	4,184	16,300
691D	Makhanga	6,934	19,905
653D	Kasinthula	8,737	22,508

Miles driven by USAID Project Vehicles during July, August, September, 1981.

The vehicle mileage traveled during the quarter by the technical assistance staff was : Baldwin 293, Hansen 3,147, Hodges 731, McCloud 3,739 and McLean 9 for a total of 7,910 or 17.2% of the total miles driven by the USAID vehicles.

ADMINISTRATION AND FINANCIAL

A critical situation has now developed hampering the Malawi Agricultural Research Project -- the failure of the Malawi Government to establish the Professional Officer, Technical Officer and Technical Assistance posts provided for in this contract. More than one year has elapsed, and we have only one temporary accountant on the project. Repeated requests to the Malawi Government see Garms letter of July 21, 1981 to Chande, have produced no action on the establishment of the posts. With the imminent arrival of three new team members there will be a total of seven Technical Assistance staff in Malawi and this failure to establish the posts called for in the Agricultural Research Contract will seriously hamper progress on contract objectives.

During the quarter, Dee F. Baldwin, Librarian completed her report. She prepared a very good report see "LIBRARY/INFORMATION CENTER", by Dee F. Baldwin, Library Consultant. Malawi Agricultural Research Project TD-4, June 1981. Miss Baldwin completed her work, and resigned from the project on August 22, 1981.

Dr. McLean and his family arrived in Malawi on August 22, 1981. He is the Horticulturist on the project, and will be stationed at Bvumbwe Agricultural Research Station.

Financial

The bank balance for the University of Florida Local Account as of September 30, 1981 was K59,053.51, Table 2. The transactions during the quarter are also shown in Table 2.

As shown in Table 3, for this quarter the commitments to the University of Florida - IFAS Local account amounted to K22,102.10, and the total since the project began was K240,138.39.

Table 2

UNIVERSITY OF FLORIDA J.F.A.S. LOCAL ACCOUNT.			
July 1 to September 30, 1981			
Date	Details	K	t
July 1	Balance Brought Forward		65,954.03
3	Deposit U.S. \$412.67		374.87
3	Deposit Press Furniture Discount Receivable		75.16
13	Dr. Hansen Travel Reimbursement N. Region and Phalombe Trips	538.33	
Aug 4	Dr Hansen Travel and Drapes Reimbursement	309.62	
4	Angelika Croteau Typing Cost for Library Report	116.44	
10	Dr. Hansen Travel Reimbursement Feb 2-16; and April 27-29	200.82	
10	Dr. Hansen Utilities Reimbursement	134.08	
10	Dr. Hodges Utilities Reimbursement	212.46	
17	Government of Malawi Claim Folio No.0077/005/46	3,720.25	
19	Dr. McCloud Utilities	454.25	
20	Dr. Hansen Reimbursement Phalombe Trip	79.06	
Sept 8	Dr. McCloud Bvumbwe, Ngabu Makoka etc., Trips Reimbursement	270.48	
11	Water Deposit (Refundable) to UF Local Account	10.00	
14	Dr. McCloud Reimbursement for Calculators	104.76	
30	Travel Advance for Gausi's Trip to Rome-London	1,200.00	
		7,350.55	66,404.06
30	Balance Carried Down		59,053.51
30	Balance As Per Bank Statement		59,053.51

Table 3

LOCAL ACCOUNT COMMITMENT SUMMARY
FOR JULY, AUGUST, SEPTEMBER, 1981

Programme	Quarterly Expenditure July, August, September	Total Expenditure Since Project Began
Maize	186.88	346.38
Groundnut	309.75	2,248.38
Pasture Agronomy	1,085.89	6,686.61
Fruit & Vegetables	--	76.30
Soil Fertility	--	408.12
Farming Systems	1,362.41	3,763.78
Research Coordination	270.48	1,474.66
Livestock	417.62	1,695.07
Library	687.76	1,496.69
Participant Training	--	7,738.50
In-Service Training	4,345.77	18,109.69
Vehicles	--	141,087.64
Overhead	<u>13,435.54</u>	<u>55,006.57</u>
Total	<u>K22,102.10</u>	<u>K240,138.39</u>

A P P E N D I X

LOCAL MAIZE TRIALS

Two sets of trials will be sponsored and monitored by this section during the 1981-82 season (in LRDP and Phalombe). An extension of the LRDP trials to the rest of LADD is sponsored and will be monitored by ADD research staff. Another set of trials in LWADD will be sponsored by the ADD but monitored by this section (less intensively than the other 2 sites due to shortage of staff). In addition, a series of interviews in LRDP will be conducted as part of another study. Each of these 4 activities is discussed more fully below.

1. LRDP Local Maize Trials

A. Objectives: There are agronomic and socioeconomic objectives. The agronomic objectives are to

- (i) evaluate the responsiveness of "local Maizes" to the application of fertilizer
- (ii) measure the variability of responses within the heterogeneous population entitled "Local Maize and
- (iii) determine the appropriate recommendations to be given to extension concerning fertilization of "local" maizes.

The socioeconomic objectives are to

- (i) measure smallholder attitudes toward and beliefs about the fertilizer-manure-types of maize ("local, composites, hybrid) complex,
- (ii) document the historic patterns of adoption and rejection of the proposed inputs of fertilizer and introduced maize varieties within LRDP; and
- (iii) determine ways in which research and extension might improve their efficiency in promoting increased maize production in Malawi

B. Methods: Two agronomic and two socioeconomic methods will be initiated to the objectives.

1. The first is an on-station comparison of 23 samples of "local" maizes and a UCA control in terms of responses to varying levels in nitrogen (0,40,80Kg/ha.) with 2 replications. This will test both responsiveness to nitrogen and the range of variation within heterogeneous population.

The maize samples from 12 farmers in LRDP were from a stratified random sub-sample of the National Sample Survey of Agriculture (NSSA), so the maizes represent a stratified random sampling of the heterogeneous population of "local" maizes in LRDP . The 6 samples from Ntcheu, 2 from Thiwi-Lifidzi and 3 from Dowa were not randomly selected but were selected from ecologically distinct areas, so they represent a stratified casual sampling of the other populations of "local" maizes.

- II. The second method is a set of an-farm trials in which the "local" maize purchased from each farmer is tested on that farmer's field with 5 levels of nitrogen (0,20,40,60,80Kg/ha.) and 3 of phosphorus (0,20,40Kg/ha.) with 2 replications. Performance of the maize in the on-farm trial will be compared with the on-station results for location and management effects. Soil samples have been collected from each field.
- III. The third method is interviewing the LRDP smallholders who are hosting the on-farm trials and their neighbours (and ADD and DAR staff) in order to determine their attitudes, beliefs and responses to the trials and the issues raised by the trials.

IV. The fourth is reviewing the relevant documents to complement smallholder interviews in determining historic patterns of change.

C. Data and Interpretation: The agronomic data from the on-station and on-farm trials will be analyzed separately, and then the on-station and on-farm yields of each particular sample will be compared. Although research recommendations on specific fertilizer applications for "local" maizes cannot be made from only one year's data, the 1981-82 data will be interpreted as a first approximation of the utility of applying varying levels of fertilizer to "local" maizes and the utility of continuing with these methods of research.

The socioeconomic data from monitoring the trials, interviewing, and reviewing documents will be used.

- (i) to interpret why smallholders utilize various types of maizes and applications of manure and fertilizers in the ways they do, given the agronomic data on relative performance under varying conditions;
- (ii) to predict directions of change in smallholder practices; and
- (iii) to recommend further action by DAR and ADD to most effectively encourage increase in smallholder maize production and productivity.

2. Phalombe Farming Systems Research Trials:

A. Objectives: There are agronomic and socioeconomic objectives. The agronomic objective is to compare the performance of 2 maize varieties (a "local" and CCA) in a standardized intercropping environment under varying levels of fertilizer. The socioeconomic objectives are similar to those for the LRDP trials with the additional objectives of discovering

- (i) common intercropping patterns and

- (ii) smallholder beliefs about and attitudes toward intercropping mixtures and monocropping.

B. Methods: One agronomic and two socioeconomic methods will be initiated to achieve the objectives.

- (i) The agronomic is a set of on-farm farmer-managed trials in which there are 4 treatments and no replications; treatments are a 2 x 2 contrast of "local" and CCA maize in a standardized intercropping mix with cowpeas and sunflower without and with (recommended level of one bag of 20:20:0 and 2 bags of S/A per acre) fertilizer. Each treatment is large enough (10 stations x 8 x 8 ridges) for the smallholder to experience the labor and capital costs per treatment and appreciate the differences in yield. A total of 16 farmers (8 in 2 different areas) will host the trials, each farmer serving as a replicate for purposes of analysis. Soil samples from each field have been collected.

- (ii) and (iii) The same 2 socioeconomic methods will be used as in the LRDP trials. Approximately one week per month will be spent in Phalombe by the Farming Systems professional staff.

C. Data and Interpretation: These are the same as noted for the LRDP trials except that there will be no on-station data and there will be multiple crop interaction to be analyzed. In addition to gross statements (only 2 point observation) about fertilizer effects, interpretation will focus on comparative performances of the 2 varieties and on future intercropping trials in Phalombe.

3. LWADD Trials

A. Objectives: The LWADD management and extension staff wish to rapidly broad guidelines for recommending

Fertilizer levels and composite maize varieties in the whole ADD in various common intercropping mixtures. The objectives of the Farming Systems Section are the same as those noted for Phalombe.

- B. Methods: The ADD was divided into 5 zones on the basis of soil type, utilizing of soil mapping devised by someone in Zomba.

Three common intercropping mixtures with maize were determined (maize with groundnuts, maize with beans, maize with cowpease) with monocropped maize as a control. Within each zone 4 farmers will be chosen to practice each of the intercropping mixtures or monocropping so there will be 80 trial farmers in the ADD (4 farmers x 4 mixtures x 5 zones).

An on-farm trial will be conducted on each of the 80 farms. On each farm there will be 8 treatments, each treatment being 8 ridges by 11 meters along the ridge, with no replicates. The treatments are 2 x 4 design in which 4 varying levels of fertilizer (0, one bag of S/A, 2 bags of S/A, one bag of 20:20:0 and 2 of S/A per acre) in bag per acre measures are applied to 2 maize varieties (local plus whichever composite is recommended locally). Since 4 farmers within each soil zone will be trying each intercropping combination or the monocropping control, it is hoped that the 4 will serve as replicates for analysis.

Research staff, including the farming systems analyst, expressed some criticisms of the research design. Standardization of intercropping factors (using the same density and planting pattern) needs to receive more attention. Climatic factors, primarily rainfall, are ignored in the selection of zones. Four replicates are variation among different farmers.

These trials are the responsibility of the ADD, however, and they are eager to have rapid first approximations

of everything (intercropping x maize variety x fertilizer rates) everywhere. The ADD management has responded to some research guidance, and the trial method outlined above is the compromise agreed to by the ADD.

The farming Systems Section as well as the agronomists from Rvumbwe will be monitoring the trials. The monitoring methods will be the same as those noted for Phalombe, except that less time will be spent in LWADD (approximately 2-3 days a month).

- C. Data and Interpretation. These are the same as those noted for Phalombe with the reservation that agronomic data may be difficult to analyze (extremely high standard deviations due to inter-farm variation) and have low levels of confidence due to the same variation plus indecision about the control of standardization.