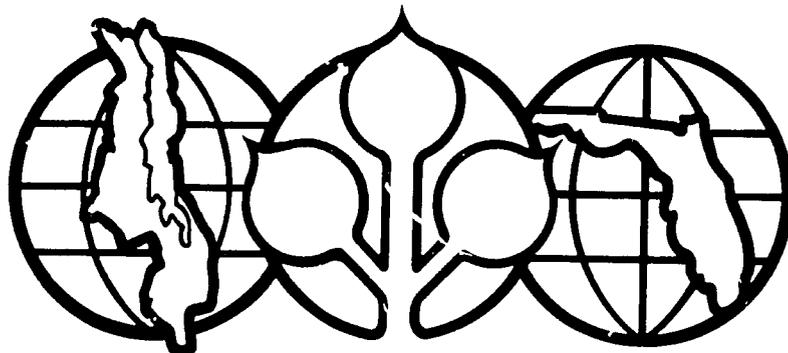


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Malawi Agricultural Research Project

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

The Department of Agricultural Research
Ministry of Agriculture, Malawi

The U.S. Agency for International
Development

PD-AAW-044

WORK PLANS

TECHNICAL ASSISTANCE TEAM

June 1980 to September 1984

University of Florida - USAID

Contract No. 612-0202

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INTRODUCTION

The University of Florida technical assistance team is in Malawi as part of a project to strengthen the Department of Agricultural Research of the Ministry of Agriculture. This project is funded by the United States Agency for International Development (USAID) and the Malawi Government. The University of Florida is administering the project.

This work plan is a result of the joint efforts of the entire technical assistance team. It covers the time frame that each individual team member expects to be in Malawi.

Special acknowledgements are due Dr. Gray since he first suggested the format which the team adopted for their work plans.

This report was printed using the Apple II computer, with Super Text word processor, that the project has introduced into the Department of Agricultural Research. Mr. Emerson H.M. Kanthungo, Stenographer/Secretary with the department produced most of this report.

WORK PLAN - D. E. McCloud, Research Coordinator

Period: June 14, 1980 to September 30, 1984

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

I. PROJECT PURPOSE: Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service.

II. PROJECT GOAL: To increase the per capita real income and the productivity of smallholders. The goal will be partially achieved at the end of the project, but substantial nationwide improvements will correspond to the 15 to 20 year NRDP life span.

III. PROJECT OBJECTIVES VERIFIABLE ACTIVITIES

- A. Strengthen research programs.
1. Develop and initiate field research projects in peanut crop physiology. This is a new research area introduced by the project, and it will provide a better understanding of Malawi's low yields.
 - a. Peanut yields in Malawi are relatively low. The question is whether low yields are an inherent aspect of Malawi varieties or the result of other factors? A physiology of peanut yield experiment to answer this to be completed by July 1982.
 - b. Malawi soils are generally low in magnesium, a plant nutrient which can cause low yields. Since Mani Pintar has a relatively high partitioning to pods (.8), the question is are the low yields due to a lack of magnesium? A dolomite experiment to answer this question to be completed by July 1981.
 - c. Chaliabana has a relatively low partitioning of assimilates to pods (.6), compared to Mani Pintar (.8). The question is can Chaliabana yields be increased with Kylar? A Kylar experiment to answer this to be completed by July 1983.
 - d. Two new peanut varieties are being developed for release to Malawi smallholders: CG1 and SAC 58. The question is whether these have the yield potential conferred by a high partitioning of assimilates to pods? A physiology of peanut yield experiment to answer this question to be completed by July 1983.
 2. Introduction of programmable calculators to Malawi. Most researchers had no programmable calculators prior to the Agricultural Research project, but had access to a few antiquated, non-programmable calculators which would only add, subtract, multiply and divide.
 - a. Introduction of the TI-55, a simple, inexpensive, programmable calculator. This calculator was introduced to teach the elements of calculator programming for field plot and laboratory data conversion to be completed by February 1981.

- b. Introduction of the HP-41C programmable calculator to Malawi will allow complex conversions of raw data from laboratory and field experiments. Goal is to introduce at least one HP-41 calculator per branch station, and one per section at main stations. Calculator introduction to be completed by August 1983.
 - c. The HP-41C programmable calculator will facilitate simple statistical analysis of research data, training on programming to be completed by September 1983.
 - d. The HP-41C will allow simulation modeling of peanut yields which provide a better understanding of the crop-yield formation process. Write programs for a peanut simulation model for peanuts to be completed by October 1980.
3. Introduction of micro-computers to Malawi. Since the project paper was written, the micro-computer field has advanced rapidly. It is feasible to utilize micro-computers to replace the costly, slow tasks that the Government of Malawi central computer now does.
- a. Introduction of the HP-85 computer to Malawi. This desk-top computer has the same capacity as Malawi's central computer. For all the statistical analyses performed on the Malawi Government computer, the HP-85 is more economical and more rapid. Two HP-85's will be introduced by March 1981.
 - b. Write programs for simulation model for peanuts for the HP-85 computer to be completed by August 1981. Write programs for a peanut simulation model for the Apple II computer by September 1982.
 - c. Development of programs for statistical analysis of field trials for the HP-85 computer to be completed by October 1981.
 - d. Introduction of the Apple II computer to Malawi. This computer is about half the cost of the HP-85 system and it will do far more than the HP-85. The Apple II system will be introduced to Malawi in August 1982.

B. Administrative management.

- 1. Personnel and Team Leadership, the Research Coordinator serves as Chief of Party for six team members.
 - a. Serve as research coordinator and team leader, through September 1984.
 - b. Supervise the administrative staff consisting of: 2 Executive Officers, 2 Clerical Officers, 1 Stenographer, 1 Copy-Typist, 1 Messenger. To be added are: 1 Computer Programmer and 1 Computer Operator, through September 1984.
 - c. Coordinate TDY requests and submit to UF, USAID and GOM, continuing through September 1984.

- d. Prepare vacation, med-evacuation, dependent requests, and related personnel matters; continuing through September 1984.
 - e. Assist in recruiting; approve team members, and present to USAID and GOM; continuing through September 1984.
 - f. Train administrative staff in the use of the Apple computer as a word processor by June 1982.
 - g. Train administrative staff in use of the Apple II computer for accounting ledgers by September 1982.
 - h. First vehicle purchase: 4 station wagons, 6 land rovers, 10 motorcycles, to be completed by November 1980.
 - i. Second vehicle purchase: 4 pick-up trucks, 1 land rover, 5 motorcycles, to be completed by April 1982.
 - j. Monitor construction and report to USAID as necessary, continuing until construction is completed.
 - k. Compile Quarterly and Annual Reports, continuing through September 1984.
 - l. Attend meetings of USAID, GOM and UF as necessary to keep informed on policy, plans and programs; continuing through September 1984.
2. Procurement and Inventory
- a. Develop appropriate purchasing procedures in accordance with UF, USAID and GOM policies; by November 1981.
 - b. Prepare receiving and inspection reports for USAID, continuing until purchasing is completed.
 - c. Develop a commitments ledger for the local account which can be computerized to be completed by May 1982.
 - d. Develop an inventory control system which can be computerized to be completed by July 1982.
 - e. Process claims for reimbursement to the Malawi Government, and send copies of payment documents to UF, continuing through September 1984.

C. Participant training.

- 1. Approximately 33 research personnel at MSc and PhD skills will be trained.
 - a. Develop selection criteria for participant trainees based on GRE and TOEFL examination scores, to be completed by April 1981.
 - b. With the team's assistance nominate trainees, and present to the Ministry of Agriculture, until all 33 trainees have been sent.
 - c. First Group: 10 PhD, 2 MS trainees to be sent in December 1980.

- d. Second Group: 2 PhD, 6 MS trainees to be sent in June and December 1981.
 - e. Third Group: 1 PhD, 4 MS trainees to be sent in December 1982.
 - f. Fourth Group: 5 MS trainees to be sent in August 1983.
 - g. Fifth Group: 3 MS trainees to be sent in August 1984.
 - h. Process dependent requests for trainees, and assist them with their U.S. visas, continue until all requests have been fulfilled.
 - i. Assist in the orientation of trainees, continue until all trainees have been sent.
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- D. Improved support staff capability
 - 1. Conduct on the job training by teaching courses, and with selected out of Malawi short courses.
 - a. Coordinate In-Service training requests, and present to USAID for approval, continue until all requests have been filled.
 - b. Teach a course in Crop Ecology to professional officers in April-May 1981.
 - c. Teach a course in Crop Yield Dynamics to professional officers in August-September 1981.
 - d. Teach a course in Calculator Programming to technical officers in September 1983.
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- E. Departmental organization.
 - 1. Assist in reorganizing DAR to conform to the 8 ADD's.
 - a. To promote improved research-extension liason, to be completed by April 1983.
 - b. To allow better allocation of research funds, and to make research more responsive to smallholder needs, continuing through September 1984.
 - c. To reduce travel by research personnel by identifying key ecological sites to be completed by November 1982.
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- F. Conduct necessary field trials.
 - 1. To effect a major reduction in the number of field trials conducted by groundnut researchers.
 - a. Determine by across location statistical analysis the key locations for research tests, to be completed by November 1982.

- b. Reduce the test site numbers to those necessary to give information for the ecological zones across Malawi, to be emphasized before trials are planted, November 1980, 1981, 1982, 1983.
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G. Annual meetings.

1. Research and Extension Staff attend meetings and field days.
 - a. Assist in planning Field Days, continue to September 1984.
 - b. Assist in planning Research-Extension Meetings, continue to September 1984.
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H. Publications.

1. Issuance of research publications or recommendations on which extension publications can be released to smallholders.
 - a. In the Dilseeds Section, three per year by 1982, and five per year by end of project.
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I. Establish base line data (and field trials) for the reduced number of EPA's.

1. Work cooperatively with the Agricultural Economist and/or Farming Systems Analyst as required.
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J. Other project-related activities.

1. Serve as Head of the Dilseeds Research Section, to continue until the groundnut breeder returns from training.
 2. Present invited paper at ICRISAT on "Physiological basis for yield improvement in peanuts" October 1980.
 3. Present invited paper at IITA on "Crop yield dynamics" May 1982.
 4. Serve as pastures advisor after the Pasture Agronomist leaves and continuing until the Pasture Research Officer returns from graduate training.
 5. Attend American Society of Agronomy meetings December 1982 and 1983.
 6. Take vacation R/R June 1981. Home leave December 1982 - January 1983. Vacation R/R December 1983.
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WORK PLAN - E.M.HODGES, FORAGE AGRONOMIST

Period: October 11, 1980 to November 15, 1982

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

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| I. PROJECT PURPOSE: | Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service. |
| II. FODDER AND PASTURE PRODUCTION GOAL: | The identification of more productive indigenous and introduced fodder and pasture crops and upgrading production and utilization procedures in order to increase smallholder livestock enterprise output. |
| III. PROJECT OBJECTIVES | VERIFIABLE ACTIVITIES |
| A. Strengthen research programs in forage production and management as relating to smallholders. | <ol style="list-style-type: none"> 1. Increase the genetic base of species available for fodder and forage production. <ol style="list-style-type: none"> a. Collect indigenous plant materials for evaluation as improved forage producers. August 1981 and continuing. b. Bring in from outside Malawi accessions of forage species with emphasis on <u>Cynodon</u>, <u>Chloris</u> and <u>Leucaena</u> species and establish these materials in test plots at several locations for screening and increase purposes. 1981-1982. 2. Evaluate the effect of site and management practices on production and utilization of forage species. <ol style="list-style-type: none"> a. Evaluate replicated plot yield of "promising grasses" and of Malawi collected <u>Setaria</u> accessions over a 3-year period. Begin December 1980. b. Complete evaluation of leaf yield of <u>Leucaena</u> in response to stubble height and harvest frequency. December 1980 to June 1981. c. Observe the competitive value of three legumes in combination with three grasses under mob-grazing management. January 1981-November 1982. d. Establish forage legume test plots at Mbawa and Mzuzu locations. November 1982. e. Measure the effect of plant spacing and regrowth interval on green chop yield of <u>Ntchisi panicum</u>. Plant in February 1982, harvest in 1982-83 rainy season. 3. <u>Leucaena</u> as a source of protein for livestock production. <ol style="list-style-type: none"> a. Evaluate new genetic material from the World <u>Leucaena</u> Collection. December 1981. |

- b. Move FAO Christy-Norris pellet mill to Chitedze, recondition for pelleting pure and blended leaf feeds, January to June 1981 and continuing (cooperative with Farm Machinery Section, National Seed Company and Veterinary Division).
 - c. Harvest and store leucaena leaf for ration additive and other uses. May-June 1981, May-June 1982 (Cooperative with Livestock Section).
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- B. Determine the productivity of adapted pasture species in terms of animal production; develop a pasture base for livestock research.
 - 1. In cooperation with Dr. R. C. Gray establish a grazing experiment at Chitedze.
 - a. Initial preparation of area, February to May 1981.
 - b. Obtain all planting material by November 1981.
 - c. Plant three replicates and fertilize all treatments uniformly with 250 kg/ha single superphosphate. January and February 1982.
 - d. Begin grazing December 1982.
 - 2. In cooperation with Dr. R. C. Gray plan a pasture trial at Mbawa Research Station, October 1982.
 - 3. In cooperation with Dr. R. C. Gray plan and initiate a pasture program at the Lunyangwa Research Station, December 1982.
 - 4. In cooperation with Dr. R. C. Gray plan and initiate pasture program for livestock breeding research at Chitala Research Station, November 1982.
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- C. Procure equipment for processing experimental forage plant samples and other agronomic plant research materials.
 - 1. Obtain components for electric-heated thermostatic-regulated sample drying ovens at Chitedze and Lunyangwa, June 1982.
 - 2. Place Allen plot harvester in operation - September 1982 (Cooperative with Farm Machinery Section).
 - 3. Install work benches, storage cabinets and plumbing in Fodder, Pasture and Livestock laboratory areas, March 1981.
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- D. Conduct in-service training for fodder and pasture technical staff; other teaching.
 - 1. Forage crop lectures to agronomy students, Bunda College of Agriculture, June 1981.
 - 2. With Mr. H. D. Mciska attend 4th regular meeting of SARCCUS subcommittee for veld and pasture, Nylsvlei Ecosystem Project, Transvaal, South Africa August 24-26, 1982; consult staff at Animal Nutrition Center, Irene, Transvaal, August 27, 1982.
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- E. Training of Malawian Professional research personnel to M.S. and Ph.D. levels.
1. One candidate for Ph.D. training, December 1980.
 2. One candidate for M.S. training, June 1983.
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- F. Additional project-related technical staff.
1. Establish position for and recruit one Technical Assistant, September 1982.
-
- G. Issue research publications for Technical Officers and Technical Assistants in extension service dealing with smallholder forage and livestock.
1. Leucaena Production in Malawi, published by Extension Aids, June 1981.
 2. Update the Pasture Handbook for Malawi, November 1982.
-
- H. Other project-related activities.
1. Coordinator for fodder and pasture crops.
 2. Participant training planning.
 3. Attend the International Grassland Congress at Lexington, Kentucky June 1982.
 4. Take vacation R/R July 1981.
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WORK PLAN - A. Hansen, Farming Systems Analyst

Period: January 30, 1981 to April 15, 1983

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

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- I. PROJECT PURPOSE: Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service.
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- II. FARMING SYSTEMS GOALS: Analyze smallholder farming systems in Malawi to determine priorities for research and extension, to clarify the reasons why smallholders accept and/or reject research-extension recommendations, and to facilitate the development and implementation of crop and livestock recommendations that are acceptable to the majority of smallholders in various recommendation domains.
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- III. PROJECT OBJECTIVES: VERIFIABLE ACTIVITIES
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- A. TA team and DAR establish selected new operations:
Farming systems research.
1. Secure support for the new program from Ministry of Agriculture. Farming systems integrates the work of several different departments within the ministry, so all of them have to agree with the proposed work plan.
 - a. Hold meetings with ministry officials to discuss work plan, February and March 1981. Secure approval of work plan, March 1981.
 - b. Establish Farming Systems Analysis Section of DAR in February 1981 at Chitedze Research Station.
 2. Recruit, select, and hire Malawi staff.
 - a. Interview Chancellor College senior year students in economics and select best candidates, February 1981.
 - b. Hire first staff member July 1981. (Treasury delays creation of new positions until November).
 - c. Hire second and third staff members July to December 1981.
 3. Acquire office space at Chitedze Research Station for the Farming Systems Analysis Section.
 - a. Move to permanent office in November 1981.
 - b. Renovate building and acquire furniture and supplies, February through December 1982.
 4. Establish farming systems research process in selected areas of Malawi. There are four basic steps in the process: diagnostic surveys, planning, running trials, and turning over to extension and/or redesigning additional trials.

- a. Select three areas (one in each region) in February and March 1981 to initiate farming systems research. A fourth site chosen by extension in September 1981. Work in these areas throughout tour.
- b. Trials are run each cropping season which focus on major food and/or cash enterprises and local smallholder priorities. During the first two years all trials focus on maize, the most important food crop, and especially on "local" maizes (planted on 52% of all cultivated land in 1980). Is it profitable to apply fertilizer to "local" maizes? What is the range of responses? Should extension continue to work only with introduced varieties? What combination of maize and fertilizer works best under conditions of intensive intercropping and drought stress, and under different levels of management in various soil and rainfall environments?
- c. Monitor trials throughout cropping season each year to collect socio-economic as well as agronomic data to understand smallholder constraints and adoption/rejection of past recommendations in relation to the treatments being tested.
- d. Conduct diagnostic surveys during each cropping season to extend range of farming systems work to five or six extension divisions by end of tour.

B. TA team and DAR establish selected new operations:
Research/extension liaison system.

1. Establish working groups comprised of research and extension staff in various areas of Malawi as part of farming systems research program, March 1981 through end of tour. These groups jointly investigate smallholder systems and jointly plan research and extension activities based on the surveys.
2. Work with head of DAR and Chief of Party, UF/USAID team, to restructure DAR along lines more compatible with National Rural Development Programme. Help plan drafting of DAR reports for each extension area to facilitate communication between research and extension, June through September 1981.
3. Meet with extension and management staffs throughout 1981 and 1982 to explain farming systems trials. This continual liaison makes transmission of research results more effective and permits research to learn from extension about local experiences.

C. TA team and DAR establish selected new operations:
Research coordination system.

1. Initiate coordination of agriculture and evaluation research units.
 - a. Attend meetings of planning and evaluation staff at ministry headquarters and introduce them to farming systems program by June 1981.
 - b. Test questions and questionnaires in our own surveys to evolve items to fit into evaluation format by December 1982.
 - c. Join ministry working parties to redesign evaluation, agro-economic survey, and annual survey of agriculture questionnaires to reflect DAR interests.

2. Join the Agricultural Research Committee by November 1981 to help coordinate DAR research.
 3. Work with Bunda College and Chancellor College research faculty to coordinate research programs by June 1982.
-

- D. Professional research personnel functioning at MSc and PhD levels
1. Train two Malawian professional staff to M.A. level to lead farming systems research program. Both will receive training in applied social research (anthropology) at University of Florida with minors in crop production and/or agricultural economics.
 - a. Recruit staff in February 1981; hire July through December 1981.
 - b. Send off first person in December 1981.
 - c. Send off second person in July or December 1982.
 - d. First M.A. returns January 1984 and second January 1985.
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- E. Improved support staff capability.
1. On the job training for research (and extension) staff in farming systems research, 1981 and 1982.
 2. Sponsorship of research conferences on multiple cropping and socioeconomic research, September 1981 and January 1982.
 3. One week course on design and analysis of on-farm trials, October 1982.
 4. Send selected professionals to farming systems courses in Kenya sponsored by CIMMYT, March and October 1981.
-

- F. Establish base line data (and field trials) for 110 to 130 EPAs.
1. Assist in examining value of widespread trials and reducing duplication of research effort by end of tour.
 2. Initiate longitudinal studies of smallholders by February 1982.
 3. Plan and conduct survey of random sample of smallholders in one area to test acceptance of recommended innovations, especially concerning maize technology, by October 1982.
 4. Establish on-farm trials in various EPAs in 1981 and 1982.
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- G. Farming systems: strengthened research, relevant to smallholders.
1. Maize program.
 - a. Diagnose priority areas in smallholder-oriented maize research, 1981.

- b. Conduct trials on maize in various extension areas of country in collaboration with maize agronomy section, 1981 and 1982.
-

H. Research publications developed by TA team and counterpart staff.

- 1. Farming research reports explaining the program and detailing the method of research and its results.
 - a. General introductory report, September 1981.
 - b. Reports on first year's work in each area, July - October 1982.
 - c. Reports to conferences on multiple cropping, socioeconomic research in rural areas and women in development, September 1981 - November 1982.
 - 2. Develop list of existing publications to extension/smallholders and point out priority areas for new publications or revisions, by November 1982.
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I. Title XII institution survey of smallholder acceptance of research product.

- 1. Plan and conduct sample survey of ten representative EPAs by November 1983, based on TDY after end of tour.
-

J. Other project-related activities.

- 1. Orientation to Malawi, February 1981.
 - 2. Serve as head of the Farming Systems Analysis Section throughout tour.
 - 3. Present paper on Malawi farming systems research program at international conference in Scotland, March 1981.
 - 4. Liaison with CIMMYT Eastern Africa Economics Program to encourage their training support for the program, March 1981 through end of tour.
 - 5. Work with dozens of international consultants and teams during tour.
 - 6. Take vacation R/R leave July 1982.
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WORK PLAN - D. W. Pervis, Agricultural Economist

Period: September 26, 1981 to September 25, 1983

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

I. PROJECT PURPOSE: Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service.

II. AGRICULTURAL ECONOMICS GOALS

1. To establish an Agricultural Economics Section at Chitedze Research Station as a prelude to the establishment of similar sections at other research stations.
2. To begin a program of agricultural economics research in cooperation with the biological and physical scientists, to serve the country's agricultural policy makers and the smallholders.

III. PROJECT OBJECTIVES

VERIFIABLE ACTIVITIES

A. Establish an Agricultural Economics Section

1. Assist in the selection of participant trainees and the logistics of their travel to the U.S. At least two trainees to be sent by September 1983.
2. Prepare lists of books and other material necessary for an Agricultural Economics Section. One list to be prepared by March 1982 and a second by March 1983.
3. Establish sources of basic country data by June 1983.
4. Introduce concepts of systems analysis for research planning and policy development by August 1983.
5. Introduce the use of computers for data storage and manipulation and for economic analysis, by December 1982.
6. Establish standards for a computer-based data storage manipulation and analysis system using A-STAT DB Master and supertext programs for the Apple II computer, by March 1983.

B. Establish new research.

1. Participate with other disciplines in the development and preparation of multidisciplinary research and conduct the economic analysis of results.
 - a. Farm Machinery Unit, by October 1982.
 - b. Maize Agronomy/Breeding, start by December 1981 and continue.
 - c. Livestock Selection, by January 1983.
 - d. Farming Systems, continuous as desired.

- e. Pasture Management, by November 1982.
 - f. Groundnut Agronomy, by December 1981 and continue.
2. Contribute to areas of agricultural policy which are considered particularly important:
 - a. Irrigation research proposal for small farm irrigation technology, by February 1982, continuous.
 - b. Effects of various agricultural price policies, by July 1982 and as opportunity arises.
 3. Analyse data from past years for possible policy direction (particularly regarding fertilizer recommendations):
 - a. "Local" maize data from Dowa, by April, 1982.
 - b. Rice data, by May 1982.
 - c. Maize of different varieties which have been tested for fertilizer response for the last four years on many sites in seven ADD's, by January 1983.
 - d. Other data as available, by September 1983.
 4. With Maize Agronomy/Breeding, begin and continue maize fertilizer trials designed especially for the development of production functions for economic analysis and making fertilizer recommendations, by December 1981 and continue.
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- C. Conduct in-service training for Agricultural Economics counterparts, and others.
1. With counterpart visit Agricultural Economics office of CIMMYT in Nairobi in November 1982.
 2. Visit IITA Agricultural Economics Department with at least one counterpart, in April, 1983.
 3. Visit Agricultural Economics Department of ICRISAT with at least one counterpart, by September 1983.
 4. Present courses in economics
 - a. General Economic Principles, by November 1982.
 - b. Principles of Production Economics, by June 1983
-
- D. Issue research publications for Technical Officers and Technical Assistants in Extension Service dealing with Agricultural Economics and Farm Management.
1. Contribute as appropriate to the publications initiated by other team members.
 2. Review and revise current "Farm Management Handbook", by April 1983.
 3. Prepare a publication on Simplified Programming which can be done by anyone who can read, write and do simple arithmetic, by July 1983.

E. Establish base line data for
110 to 130 EPA's.

1. Work cooperatively with biological scientists as appropriate.

F. Other project-related
activities.

1. Serve as Head of the Agricultural Economics Section at Chitedze
Agricultural Research Station.

2. Prepare long range plans for Agricultural Economics Research

a. Development plan for computer based simulation model of smallholder
farm/household relationships.

b. Develop plans for computer based simulation model of Malawi's
agricultural sector.

3. Take vacation R/R, July 1982.

WORK PLAN - R. C. GRAY, ANIMAL SCIENTIST

Period: September 14, 1981 to September 13, 1983

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

I. PROJECT PURPOSE: Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service.

II. LIVESTOCK PRODUCTION GOAL: To develop systems of breeding, feeding and management of dairy cattle, beef cattle, goats, swine and poultry, suitable for smallholders, to enable the country to meet the nutritional requirements of its people by providing adequate meat, milk and eggs in the diet, with a secondary goal of providing surplus products such as hides for export.

III. PROJECT OBJECTIVES

VERIFIABLE ACTIVITIES

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| <p>A. Strengthen research programs in selected livestock areas, relevant to smallholders.</p> | <ol style="list-style-type: none"> 1. Develop and initiate research projects in dairy cattle breeding and production during the two years as follows: <ol style="list-style-type: none"> a. Calcium and phosphorous supplementation of dairy cattle by July 1982. b. Crossbreeding Sahiwal and (Friesian X Malawi Zebu) for dairy production by August 1982. c. A Comparison of the utilization of four concentrates for lactating cows by October 1982. d. A Comparison of zero grazing and grazing management systems for smallholder dairying by March 1983. e. A Comparison of two suckling systems and calf age at weaning on the growth rates of calves and the milk production of their dams by April 1983. f. Systems of rearing replacement heifers by September 1983. 2. Develop and initiate research projects in beef cattle breeding and production as follows: <ol style="list-style-type: none"> a. Dry leucaena leaf and groundnut tops as major source of protein and roughage in stall feeding diets by November 1982. b. An Evaluation of crossbreeding Malawi Zebu, Friesian, Brahman and Boran breeds by January 1983. c. Improving maize stover and other crop residue utilization by laboratory techniques by March 1983. |
|---|---|

- d. Cattle feeding trials with promising treated crop residue by July 1983.
 - e. Selection for performance traits in Malawi Zebu cattle by January 1983.
3. Develop and initiate a research program in goat production:
 - a. Selection for growth rate within the Malawi Goat by January 1983.
 4. Develop and initiate a research program in sheep production:
 - a. Utilization of crop residues and madeya for stallfeeding of weaner lambs by May 1982.
 - b. The utilization of leucaena for stallfeeding lambs by May 1983.
 - c. The performance of weaner lambs on a cut and carry system with different levels of supplementation by May 1983.
 - d. Evaluation of local and exotic sheep breed crosses under Malawi conditions by December 1982.
 5. Develop and initiate a research program in poultry production:
 - a. Evaluation of two poultry breeds and two rations under deep litter system by January 1983.
 6. Develop plans for a research program in swine production by September 1983.

- B. Procurement of research equipment for feed and forage analysis laboratory to provide capability to perform the following specific analyses:
 - a. determination of protein, energy and mineral content of forages and crop residues.
 - b. determination of nutritive value of forages by "in vitro" techniques.
1. Order equipment and supplies for the laboratory by March 1982.
 2. Receive equipment in Malawi and set up for use by March 1983.
 3. Begin training of laboratory technician by March 1983.
 4. TDY assistance of Dr. J. E. Moore, University of Florida, during the summer of 1983 to check out procedures and techniques.
 5. Begin full-time operation of the laboratory for feed and forage analysis by July 1983.

- C. Determination of pasture productivity in terms of animal performance.
 1. In cooperation with Dr. E. M. Hodges, establish pasture trial at Chitedze:
 - a. Complete planting by February 1982.

b. Plan and supervise construction of fences, corral, and other facilities for pasture trial by November 1982.

c. Procure cattle and begin grazing trial by December 1982.

2. In cooperation with Dr. E. M. Hodges, plan a pasture trial at Mbawa Research Station by October 1982, to be established during the 1982-83 growing season.
 3. In cooperation with Dr. E. M. Hodges, plan and initiate a pasture program at the Lunyangwa Research Station by December 1982, to be initiated during the 1982-83 growing season.
 4. In cooperation with Dr. E. M. Hodges, plan and initiate a pasture renovation program at the Chitala Research Station by November 1982.
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D. Establish computerized record keeping system for livestock section and provide capability for statistical analysis of station trials.

1. Procure Apple II computer by May 1982.
 2. Write programs for statistical analysis of research data for all research sections by September 1982.
 3. Computerize the Malawi Zebu breeding records by January 1983.
 4. Computerize the "Dairy Recording Scheme" by July 1983.
 5. Recruit and begin training a computer operator by December 1982.
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E. Develop program to measure smallholder performance and recommend improvement in stall feeding of cattle.

1. Survey smallholder stall feeders in cooperation with Dr. D. Pervis by January 1983.
 2. Initiate laboratory trials to enhance the feeding value of crop residues utilizing "in vitro" techniques by March 1983.
 3. Develop and initiate stall feeding trials as outlined under beef cattle research proposals above.
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F. Conduct in-service training for livestock technical staff.

1. Visit ILCA with Mr. A. P. Mtukuso in February 1983.
 2. Teach course in computer use and programming in October-December 1982.
 3. Teach a course in dairy production to livestock technical staff by July 1983.
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G. Training of Professional Malawian Research Personnel to M.S. and Ph. D. level.

1. Identify three persons for M.S. training in dairy production, livestock production and physiology of reproduction by October 1982, April 1983 and October 1983, respectively.
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- H. Additional project-related Professional and Technical staff.
1. Establish position for and recruit two Professional Officers:
 - a. Dairy Production Officer by July 1982.
 - b. Physiology of Reproduction Officer by April 1983.
 2. Establish position for and recruit a Technical Officer for the Laboratory Supervisor position by December 1982.
 3. Establish position for and recruit a Technical Officer for computer operator by December 1982.
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- I. Issue Research Publications for Technical Officers and Technical Assistants in with smallholder livestock production.
1. Review existing publications to evaluate their adequacy by March 1983.
 2. Prepare and publish at least one publication during 1982 and one quarterly extension service dealing thereafter.
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- J. Establish base line data (and field trials) for 110 to 130 EPA's.
1. Work cooperatively with the Agricultural Economist and/or Farming Systems Analysts as required.
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- K. Other project related activities.
1. Orientation to Malawi:
 - a. Review files on past livestock research by January 1982.
 - b. Travel to research stations concerned with livestock research to become familiar with available facilities and existing programs by January 1982.
 2. Serve as Head of the Livestock Research Section
 3. Prepare long range plans for Livestock Research.
 - a. Develop a plan to relocate beef cattle breeding research from Dzalanyama Ranch to other research stations by December 1982, with implementation of the plan to be phased over a period of years, depending upon fund availability.
 - b. Develop long range plans for research programs in each species in consultation with Malawian Professional Officers, by September 1983.
 - c. Initiate a Task Force to study the relationship of the Livestock Sections of the Department of Research, the Department of Animal Health and Industry, and the Department of Development, with the aim of developing a plan for a coordinated working relationship among the three groups.

4. Serve as Chairman of the Equipment Procurement Committee.
 - a. Order all project related equipment by January 1983.
 - b. Receive all project related equipment and issue to appropriate sections, as received.
 5. Take vacation R/R, October 1982.
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WORK PLAN - S. F. Pasley, Plant Breeder-Agronomist

Period: September 30, 1981 to September 29, 1983

PROJECT TITLE: MALAWI AGRICULTURAL RESEARCH (612-0202)

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- I. PROJECT PURPOSE: Strengthen the capability of the Department of Agricultural Research to provide socially acceptable and economically sound research for smallholder needs in satisfactory quality and quantity and in form useable by extension service.
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- II. PLANT BREEDING-AGRONOMY GOAL: To increase the per capita real income and the productivity of smallholders. The goal will be partially achieved at the end of the project, but substantial nationwide improvements will correspond to the 15 to 20 year NRDP life span.
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- | III. PROJECT OBJECTIVES | VERIFIABLE ACTIVITIES |
|--|---|
| <p>A. Maize breeding: strengthened research, relevant to smallholders.</p> | <p>1. Research programs functioning at stations and trial centers in the major ecological zones.</p> <p>a. From past records, define the major ecological zones in terms of maize production by April 1982.</p> <p>b. Establish working relations with International Research Centers and with Research Centers in neighboring countries to facilitate the exchange of germplasm by April 1982.</p> <p>c. Establish research priorities for maize breeding by September 1982.</p> <p>d. Establish a limited breeding program in Lakeshore area and in the Shire Valley by December 1982.</p> <p>e. Form a new breeding population from maize genotypes that are adopted to the Lakeshore area and the Shire Valley by April 1983.</p> |
| <p>B. Maize agronomy: strengthened research, relevant to smallholders.</p> | <p>1. Research functioning at stations and trial centers.</p> <p>a. Review past records and establish research priorities by September 1982.</p> <p>b. Establish trials with adapted varieties in the major agro-climatic zones emphasizing reduced tillage, use of forage legumes as a green manure, plant spacing and population, etc. by November 1982.</p> <p>c. Work with the Agricultural Economist to describe a production function for maize by June 1983.</p> |
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C. Wheat agronomy: strengthened research, relevant to smallholders.

1. Research functioning at appropriate stations and trial centers.
 - a. Review past research and establish research priorities by December 1982.
 - b. Establish working relations with the International Research centers and with Research Centers in neighboring countries to facilitate the flow of germplasm and information to Malawi by December 1982.
 - c. Establish trials in the major agro-climatic zones to screen varieties for adaptability and to determine the feasibility of interplanting wheat in maize by April 1983.
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D. Publications

1. Issue Research Publications for Technical Officers in the extension service dealing with maize and wheat production.
 - a. Review past research and update recommendations by July 1983.
 - b. Update recommendations yearly as research data warrants.
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E. Establish field trials in a reduced number of EPAs.

1. EPAs are established for the convenience of extension, not for differing agro-climatic conditions. It is not in the best interest of research to conduct trials in all of the EPAs in Malawi. In fact, it is the responsibility of research to define agro-climatic regions and conduct trials at a few locations that are representative of the much larger area. By doing this, research can make the best use of limited research monies and at the same time conduct well managed trials that will provide meaningful data.
 2. Analyze past maize breeding research data to identify locations that are representative of much larger areas by July 1983. This is being done to make better use of research monies and to reduce field trials to an optimum level.
 3. Establish trials in the major wheat growing areas. Trials to test varieties and agronomic practices and to determine the necessity of conducting trials at a number of locations by April 1983.
 - a. Reduce number of maize and wheat trials by September 1983.
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F. Foundation seed

1. Produce breeders maize seed for release to the National Seed Company of Malawi.
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6. Improved support staff capability

1. Identify two Professional Officers for graduate training in Maize Breeding by August 1982.
 2. Reassign additional support staff outlined in the Project Paper for Maize Breeding at Chitedze to Maize Breeding at Ngabu and Maize Agronomy at Chitedze by August 1982.
 3. Identify a short term technical assistant to teach an Experimental Design Course by August 1982.
 4. Send a Maize Professional Officer to IITA to study methods of breeding and screening for resistance to maize streak virus by November 1982.
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H. Other project-related activities.

1. Serve as the Head of the Maize Breeding Section.
 2. Serve as the National Maize Coordinator.
 3. Serve as the work plan coordinator for the USAID/UF Technical Assistance Team.
 4. Provide agronomic advice to Technical Assistance Team Members who are not agronomists but who are involved in agronomic research.
 5. Assist the USAID/UF Chief of Party in development of Phase II of the Malawi Agricultural Research Project Proposal.
 6. Cooperate with the University of Florida to:
 - a. Determine the effects of interplanting forage legumes with maize.
 - b. Determine the effects of forage legumes on the nitrogen status of the soil.
 - c. Determine the effects of forage legumes on soil pathogens specifically root-knot nematodes.
 7. Attend the Corn and Sorghum Conference at Chicago, Illinois in December 1982.
 8. Take vacation R/R, July 1982.
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