



Malawi Agricultural Research Project

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

The Department of Agricultural Research
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I. Introduction

This is the fourteenth quarterly report and covers the third quarter of the 1984 Malawi fiscal year, October-December 1983.

II. Highlights

The Experimental Techniques Course -- With Emphasis on the HP-41 Calculator, was given by Dr. McCloud to six participants at the Lunyangwa Research Station in October.

Eight participant trainees funded by the Project were processed and departed for the U.S. on December 30th.

Dr. Pervis collaborated with an Irrigation Agronomist at Kasinthula Research Station and analyzed 14 experiments. The results included estimated demand functions for irrigation water for several crops. This was of particular interest to the Planning Office because of its policy implications.

Mr. Batson Zambezi, the second student under the Project to complete an M.Sc., returned to Chitedze where he will conduct his dissertation research before returning to the U.S. to complete his Ph.D.

Dr. George Marlowe from the University of Florida spent a month in Malawi assisting research personnel from Bvumbwe ARS in developing and refining the Vegetable Research Program.

The Master Plan for the Reorganization of the DAR and a Project Preparation Document were presented to representatives from the World Bank, USAID, and the European Economic Community for their consideration for funding of the next Agricultural Research Project.

The Second In-Country Adaptive Research Training Workshop, conducted jointly by the USAID/UF/Malawi Agricultural Research Project and the USAID/CIMMYT Eastern Africa Farming Systems Project, was held at Chitedze ARS in October, and was attended by thirty participants.

Dr. Janicki conducted preliminary analysis of the informal survey information collected last quarter to help identify smallholder farmers' problems.

Arrangements were made with the Director of the U.S. Information Service, Malawi, for in-country coverage of the Project which will take the form of a newspaper article.

The draft for the Pasture Handbook was approved and funds were obtained from the Malawi-Canada Dairy Project to print 1,000 copies.

IV. Training

Participant

Nine of ten of the final participant trainees funded by the Project were placed in six different universities in the United States. Eight of the nine were processed and departed for the United States on December 30th. One third of the Research officers in the DAR will have been trained to the M.Sc. or Ph.D. level by this Project. See Appendix A, page 13 for a list of participants, their programs, and positions within the MOA upon completion of their studies. See Appendix B, for suggested Training Plans for the new participants.

Mr. Batson Zambezi, Chitedze ARS, returned from the University of Florida with an M.Sc. in Agronomy. He will conduct his dissertation research on maize breeding in Malawi under the supervision of the Technical Assistance Team and then return to the United States to complete his Ph.D.

In-Service

On October 19 and 20, the Experimental Techniques Course -- With Emphasis on the HP-41 Calculator was given by Dr. McCloud in the north at Lunyangwa Research Station. Part I of the course covered considerations to be followed in planning, designing, and conducting an experiment. Part II was hands-on training in the use of the HP-41C calculator. There were six students enrolled in the course at Lunyangwa. The combination of a smaller group and individual use of the calculators made for more effective teaching and learning. To date, these courses have reached 127 students, mostly T.O. and T.A. grades.

Dr. George Marlowe, University of Florida, spent a month in Malawi assisting research personnel from Bvumbwe ARS in developing and refining the Vegetable Research Program. He also taught a one week intensive course on vegetable production/research to research and extension personnel. The course was attended by over 40 participants.

The Project funded two research personnel from the Seed Technology Unit, Chitedze ARS, for a trip to South Africa, with the purpose of developing working relations with seed technology personnel in that country.

Mr. Nyirenda, the Officer-in-Charge, Makoka ARS, was funded to attend an Entomological Symposium in the United Kingdom at which he presented a paper.

Dr. Pervis tutored Miss Uka, a soil chemist, in the use of FORTRAN under CP/M.

Dr. Janicki coordinated the Second In-Country Training Workshop of the Adaptive Research Pilot Program which was held at the Chitedze Agricultural Research Station October 10-14. The

in-service training program is being conducted jointly by the USAID/UF/Malawi Agricultural Research Project and the USAID/CIMMYT Eastern Africa Farming Systems Project.

While at the University of Florida in December, Dr. Janicki held discussions with the staff of the Farming Systems Support Project (FSSP) concerning the Michigan State University proposed M-STAT training course programmed to be held in Malawi in April 1984. It was decided to have two Malawi technical staff members and Dr. Janicki attend an orientation course on the statistical software package M-STAT to be held 19-30 March 1984 at Michigan State University, prior to the in-country training program in Malawi.

At the request of the Deputy Chief Agricultural Research Officer, Bvumbwe ARS, Dr. Gray assisted the staff there in the use of the statistical package which was written for the Apple II computer.

Dr. Gray also presented an orientation program on the statistical package to the staff at Makoka ARS. They will use the package to analyze data submitted to them by various researchers in the DAR.

V. Research

Crop Physiology

Dr. McCloud is helping develop research projects concerning peanut crop physiology. This is a new research area introduced by the Project which will eventually provide a better understanding of Malawi's low crop yields.

Last year's work showed that Kylar was very promising for increasing yield of Chalimbana; yields were increased by 33.5%. The return over Kylar costs was K160 per hectare in last year's trials. The Kylar experiment to determine the effects of this chemical on partitioning of assimilates and yield of peanuts was run again this year. The Kylar 83 experiment was planted on December 21, and by December 31, 90% emergence had occurred.

The physiology of peanut yields experiment was designed to provide the plant breeder with information on partitioning of assimilates to obtain data on the yield potential of breeding lines and new varieties for Malawi. These experiments are named the POPY series and have been run annually since the 1979-80 season. This year's experiment, POPY 83 was the second year for two new varieties, Chitembana (E879/6/4) and Mawanga (SAC 58), which were compared to Chalimbana and Mani Pintar in a growth analysis experiment to determine their partitioning and yield potential. POPY 83 was planted December 15, 1983 and 90% emergence was on December 26.

The overall regression analysis of the 1978-79 maize data from more than 60 locations throughout Malawi shows that one kg of nitrogen produced 25.3 kg of maize. At the moment, CAN (26% N) is sold to farmers for K14 per 50 kg bag, or at a cost of K1.08 per kg of nitrogen. Maize is purchased from farmers at K11 for a 90 kg bag, or at K0.122 per kg. Thus, a farmer needs 8.85 kg of maize to recover the cost of one kg of nitrogen applied. Since the average response is 25.3 kg of maize per kg of nitrogen, nitrogen fertilization should be very profitable to Malawi smallholder farmers.

This year a new experiment, POMY 83, was added to the crop physiology studies. POMY 83 is a study to determine the crop growth rates, and the yield potential of maize in Malawi. POMY 83 was planted December 21 and 90% emergence was on December 26.

Horticulture

Dr. Arnold, with Mr. Chizala, Mr. Phiri and Mr. Chilembwe, reviewed horticultural research plots at Nkhata Bay, Lunyangwa, Limphasa, Nchenachena, Misuku Hills and Baka.

Mr. Chilembwe and Mr. Phiri were assisted with the preparation of abstracts for the 10th Africa Horticultural Symposium to be

held in Ethiopia in January 1984. Dr. Arnold, with Dr. Wayne Sherman, prepared a paper "Potential Low Chilling Peaches for Africa," to be presented at the same symposium.

Dr. Arnold developed, with Mr. Chilembwe's assistance, a proposed layout for the new fruit research area at the Bvumbwe ARS. They also developed a new experiment to evaluate different media types and container colors for containerized production of fruits. In addition, they developed a deciduous fruit training/pruning clinic for extension personnel in Ntcheu.

New genotypes from other countries were obtained for evaluation in Malawi, among them new cultivars of cinnamon and vanilla from the Seychelles.

Agricultural Economics

Dr. Pervis' research activities this quarter were facilitated by increased access to computational and text processing capabilities. In response to a request from the Planning Office of the MDA, some of the irrigation data provided by Mr. E. Barak (Irrigation Agronomist at Kasinthula ARS) were quickly analyzed to estimate the value of irrigation water.

The remainder of Mr. Barak's 14 experiments were economically analyzed and a 47 page document completed. See Appendix D, page 21 for a list of the experiments.

Responses to a LADD survey on the effects of land registration were computerized. This computerization was a collaborative effort involving LADD evaluation staff and Agricultural Economics staff at Chitedze, and is the first step in analyzing the data.

Dr. Pervis supervised Mr. O.A.H. Jere (who works half time for Adaptive Research and half time for Agricultural Economics) in the preparation of the "Agricultural Economics Data Bank Manual."

Part of "Economic Considerations" was revised and may be included in "Profitable Maize Growing."

Adaptive Research

Dr. Janicki devoted much of the quarter to analysis of the information obtained during the three informal surveys conducted last quarter. This information was used during the Second In-Country Training Workshop held at Chitedze ARS in October. Problem prioritization and economic pre-screening of research thrusts and field trial design for the 1983/84 cropping season were the main topics at the Workshop.

Utilizing the survey information, smallholder farmer problems were also identified. Those with possible research solutions were discussed by the Adaptive Research Teams, Applied Researchers from

the various sections at Chitedze and the Horticultural Section from Bvumbwe, and by representatives from the Kasungu ADD.

Plans were made for the third In-Country Training visit by CIMMYT scheduled for March 1984.

During the remainder of the quarter, cooperating farmers were selected, sites identified and experimental plots laid out. Required supplies were obtained and preparations were made to plant the trials as indicated in the program design. Most trials required the arrival of the first planting rains, so plantings began at the end of November in most of the project areas.

Three Adaptive Research Teams completed establishment of field trials in their respective Project areas. A total of 21 trial sites were planted this season. Four different types of trials have been designed to date.

Livestock/Pastures

Arrangements were made to obtain 150 head of two-year old Malawi Zebu heifers from Dzalanyama Ranch for the 1983-84 season. They were moved to Chitedze in late December.

A study, "Selection for Improvement of the Malawi Zebu," was started at the Chitala Research Station. The study compares two mating systems: (1) multi-sire and (2) single-sire, with replacements in both systems to be selected for growth rate and type.

A lamb crop was born in November and December from the Malawi ewes which had been crossed with Dorper and Vay Rooyen.

The Ca/P supplement experiment continued at Lunyangwa and the sources of protein supplement study continued at Chitedze. Analysis of the lactation data from the first year of the study showed no significant differences between sources. Both studies will continue for an additional year.

The Sahiwal crossbreeding study continued with the birth of several calves. A total of twenty calves have now been born at Chitedze and Lunyangwa.

The draft for the Pasture Handbook was approved and funds were obtained from the Malawi-Canada Dairy Project for an initial printing of 1,000 copies.

Several smallholder dairy farmers were visited in order to observe the results of the improved pasture introduction program which was begun in 1983-84. The results were encouraging and plans are underway to include 10-12 more farmers in the program during the 1984-85 season.

VI. Travel and Meetings

Arnold: Met with Mzuzu ADD Program Manager to discuss horticultural production and programs in his Division.

Met with the three PO's in the Horticulture Section to develop proposed training for extension personnel in 1984 and to set priorities for current and proposed research projects.

Participated in research program review at Bvumbwe and in Adaptive Research Training led by CIMMYT at Chitedze.

While in Florida, met with several departmental chairmen at UF, as well as with some of the participant trainees who are studying there.

Gray: At Mbawa ARS and Lunyangwa ARS reviewed livestock programs and assisted in preparation of budget requests for 1984-85 season.

Several smallholder dairy farmers were visited in order to observe the results of the improved pasture introduction program.

Made several visits to Mikolongwe Veterinary Station to assist with the swine artificial insemination program.

Conferred with personnel at Makoka and Bvumbwe on the use of the Apple II computer statistical package.

Janicki: Several meetings were held with Dr. B. Gelau, CIMMYT-Nairobi Maize Agronomist, who arrived on 14 October. The purpose of his visit was to discuss a possible in-service training program for Technical Assistant level Ministry of Agriculture Staff on field trial management.

A visit was made to Dr. Edge at Bunda College in November to discuss the Adaptive Research Program and to obtain information for possible bean-maize intercropping trials in the Ntcheu Project EPA 6.

During the week of 28 November - 2 December, Dr. Janicki was at the University of Florida where he met with numerous people to discuss items relevant to the UF/USAID/MA Agricultural Research Project. He also met with a group of the Malawi Participant Trainees to discuss the Adaptive Research Program in Malawi and to answer questions related to the Reorganization of the DAR.

Attended a meeting of the North Florida Farming Systems Project to discuss matters of mutual interest to Farming Systems Research.

Met with Dr. J.R. Simpson of the UF Department of Food and Resource Economics to discuss the possibility of a collaborative livestock research project.

McCloud: Participated in the CIMMYT In-country Training Adaptive Research Workshop at Chitedze.

Presented the Experimental Techniques Course -- With Emphasis on the HP-41 Calculator at the Lunyangwa Research Station.

Pasley: Attended the USAID Africa Bureau Agricultural and Rural Development Workshop held in Harare, Zimbabwe 6-9 December 1983.

As a member of the Local Preparation Team (LPT), met with members of the World Bank in late December to discuss the Master Plan and the Project Preparation Document.

Arranged with the Director of the U.S. Information Service, Malawi, for in-country coverage of the Project. This coverage is to take the form of a newspaper article.

Pervis: Attended a meeting of the Malawi Credit Union Society which included representatives from the World Council of Credit Unions.

Met with officials at the Central Regional Office of ADMARC and obtained latest prices.

Attended meeting conducted by Dr. Janicki and Mr. Bolt to introduce Adaptive Research to Section Heads at Chitedze.

VII. Administration

With the LPT and consultants from IADS, the Master Plan for Reorganization of the DAR and a Project Preparation Document were presented to representatives from the World Bank, USAID, and the European Economic Community for their consideration for funding the next Agricultural Research Project.

With advice and counsel from USAID/MA, IP-UF, and the DAR, a final budget was prepared for the Project including: long- and short-term technical assistance requirements; commodity requirements; and participant and in-service training requirements.

The DAR and USAID/MA agreed to use Project funds to hire an individual to develop/organize the Malawi Agricultural Research Library, to train Malawi Library staff, to serve as an Administrative Aide to the Project and to train Malawi administrative staff.

VIII. Finances

See Appendix C, Tables 1 and 2 for a summary of Project financial transactions this quarter.

IX. Publications

For a brief summary of the contents of items 1-6, see Appendix D, page 21.

1. *Economic Analyses of Some Irrigation Experiments Conducted by Kasinthula Research Station, 1992 (preliminary)*. D.W. Pervis and E. Barak. December 1983. 47 pages.
2. *Experimental Techniques Course -- With Emphasis on the HP-41 Calculator*. D.E. McCloud, L.J. Janicki, F.W. Kisyombe and Wm. Stephens. October 1983. 5 pages.
3. *Nitrogen Rates on Maize 1976-79*. D.E. McCloud. November 1983. 4 pages.
4. *Nitrogen Rates on Maize 1976-77*. D.E. McCloud. December 1983. 2 pages.
5. *A Report on an Economic Analysis of Three Experiments Yielding Estimated Demand Functions for Irrigation Water on Maize, Wheat and Beans in the Lower Shire Valley of Malawi (preliminary)*. D.W. Pervis and E. Barak. November 1983. 10 pages.

6. *Proceedings of the Second In-service Adaptive Research Training Workshop, 10-14 October, 1983.* Edited by L.J. Janicki and R.S. Bolt, Adaptive Research Section, Chitedze Agricultural Research Station. 39 pages.
7. *System Overview Contents: Dowa West DO/1 and DO/2.* Adaptive Research Section, Chitedze ARS.
8. *System Overview Contents: Thini/Lifidzi RDP.* Adaptive Research Section, Chitedze ARS.
9. *System Overview Contents: Ntcheu RDP (EPA 6).* Adaptive Research Section, Chitedze ARS.

APPENDIX A

PARTICIPANT TRAINING QUARTERLY REPORT
October 1 to December 31, 1983

Name	Degree	Training	University	Departed	Months Accumulated	Returned or Due Back	Program on Return	Station on Return
Chapla, E.M.	Ph.D.	Plant Pathology	Univ. of Fla.	Dec. 80	36	Apr. 84	Horticul.	Bvumbwe
Chigwe, C.F.E.	Ph.D.	Plant Breeding	Univ. of Ariz.	Dec. 81	24	Dec. 94	Cotton	Makoka
Chikwena, R.	M.Sc.	Agricultural Economics	Univ. of Fla.	Dec. 80	36	Mar. 84	Ag. Econ.	Chitedze
Chilembwe, E.H.	M.Sc.	Fruit Crops	Univ. of Fla.	Dec. 80	30	July 83	Horticul.	Bvumbwe
Chipala, E.E.	Ph.D.	Plant Breeding	Univ. of Fla.	Dec. 80	36	Feb. 94	Tobacco	TRA
Chiremba, A.B.M.	M.Sc.	Statistics	Univ. of Fla.	Dec. 82	12	Dec. 84	Biometrics	Makoka
Chiyembekeza, A.	M.Sc.	Plant Breeding	Univ. of Fla.	Dec. 83	--	Dec. 85	Groundnuts	Chitedze
Dzowela, B.H.	Ph.D.	Pasture Agronomy	Univ. of Fla.	Dec. 80	36	Feb. 84	Pastures	Chitedze
Edabu, A.D.	Ph.D.	Entozology	Univ. of Fla.	Dec. 82	12	Dec. 85	Horticul.	Bvumbwe
Gondwe, M.T.	M.Sc.	Vegetable Crops	Univ. of Fla.	Dec. 81	24	June 84	Horticul.	Bvumbwe
Khonje, D.J.	Ph.D.	Soil Microbiology	Univ. of Fla.	Dec. 81	24	Dec. 94	Groundnuts	Chitedze
Kisyonbe, C.T.	M.Sc.	Plant Pathology	N.C. State	Dec. 82	12	Dec. 84	Groundnuts	Chitedze
Kisyonbe, F.	**	Statistics	Univ. of Fla.	Dec. 80	17	May 92	Biometrics	Makoka
Kuswenda, J.D.	M.Sc.	Agronomy	Univ. of Ga.	Dec. 83	--	Dec. 85	Maize	Chitedze
Maliro, C.E.	M.Sc.	Agronomy	Univ. of Fla.	Dec. 83	--	Dec. 85	Groundnuts	Chitedze
Mkamanga, G.Y.	Ph.D.	Crop Physiology	Oregon State	Dec. 80	36	June 84	Adap. Res.	Chitedze
Mnyenyembe, P.H.	M.Sc.	Plant Breeding	Okl. State	Dec. 83	--	Dec. 85	Wheat	Chitedze
Msiska, H.D.C.	M.Sc.	Range Science	Texas A & M	Dec. 83	--	Dec. 85	Pastures	Lunyangwa
Mtaabo, P.J.	M.Sc.	Seed Technology	Miss. State	Dec. 81	24	June 86	Seed Tech.	Chitedze
Mtukuso, A.P.	M.Sc.	Small Ruminant Prod.	Univ. of Mo.	Dec. 83	--	Dec. 85	Livestock	Chitedze
Munthali, F.	M.Sc.	Agronomy	Univ. of Fla.	Dec. 82	12	Dec. 84	Wheat	Chitedze
Munthali, J.T.K.	Ph.D.	Animal Nutrition	Univ. of Fla.	Dec. 80	36	June 84	Livestock	Chitedze
Mwango, E.N.	M.A.	Anthropology	Univ. of Fla.	Dec. 82	12	Dec. 84	Adap. Res.	Unknown
Mzamba, C.P.	Ph.D.	Irrigation Agronomy	Colo. State	Dec. 80	36	June 85	Irrigation	Kasinthulu
Mwira, L.D.M.	M.Sc.	Agronomy	Iowa State	Dec. 81	24	June 84	Maize	Chitedze
Nkhona, D.D.	M.Sc.	Soil Chemistry	N.C. State	Dec. 83	--	Dec. 85	Soils	Bvumbwe
Nthakoswa, B.	M.Sc.	Agricultural Economics	Univ. of Fla.	Dec. 82	12	Dec. 84	Adap. Res.	Chitedze
Ntolotha, E.M.	Ph.D.	Soil Survey	Univ. of Fla.	Dec. 80	36	June 84	Soil Survey	Lilongwe
Phiri, B.S.C.	M.Sc.	Agricultural Economics	Univ. of Fla.	Dec. 83	--	Dec. 85	Adap. Res.	Unknown
Saka, A.L.	Ph.D.	Soil Physics	Univ. of Fla.	Dec. 80	36	June 84	Soils	Chitedze
Sihale, P.K.	Ph.D.	Plant Breeding	Univ. of Fla.	Dec. 82	36	Apr. 94	Groundnuts	Chitedze
Zambezi, B.T.	Ph.D.*	Plant Breeding	Univ. of Fla.	--	31	June 87	Maize	Chitedze

* conducting dissertation research in Malawi

** terminated without degree

APPENDIX B

Training Plans

A.J. Chiyembekeza

Recommended for an M.Sc. in Agronomy emphasizing plant breeding. Mr. Chiyembekeza requires training under the supervision of a groundnut breeder whose major effort is varietal development. His thesis research should be field-oriented and have direct application to his research in Malawi. He is expected to complete his degree in two years.

Suggested courses include: Advanced Genetics; Advanced Plant Breeding; Herbaceous Horticultural Crop Breeding; Quantitative Genetics; Statistical Methods in Research I and II; and Design and Analysis of Experiments I. A course in technical writing and a course in management (personnel and fiscal) are desired.

An HP-41CV calculator with STAT PAC should be provided and Mr. Chiyembekeza should be required to demonstrate his proficiency in analyzing most experimental designs with the calculator.

Attendance of an annual meeting of the American Society of Agronomy is recommended. Mr. Chiyembekeza is encouraged to present a paper on his thesis research at this meeting.

J.D.T. Kumwenda

Recommended for an M.Sc. in Agronomy emphasizing agronomic crop production. Mr. Kumwenda requires training under the supervision of a researcher whose major effort is applied and farmer-oriented. His thesis research should be field-oriented and have some direct application to his research as a Maize Agronomist in Malawi. He is expected to complete his degree in two years.

Major courses should include: crop physiology; crop nutrition; crop ecology; herbicide technology; soil fertility; water conservation and management; low-energy technology; and a sequence in the design and analysis of experiments. A course in technical writing and a course in management (personnel and fiscal) are recommended.

An HP-41CV calculator with STAT PAC should be provided and Mr. Kumwenda should be required to demonstrate his proficiency in analyzing most experimental designs with this calculator.

Attendance of an annual meeting of the American Society of Agronomy is recommended. Mr. Kumwenda is encouraged to present a paper at this meeting on his thesis research.

C.E. Maliro

Recommended for an M.Sc. in Agronomy specializing in Field Physiology and Statistics with emphasis on peanuts. He requires broad training in agronomic crop production. He is expected to complete his degree in two years.

Suggested courses include: Crop Nutrition; Crop Ecology; Physiology of Agronomic Plants; Herbicide Technology; Soil Fertility; Tropical Soils; Design and Analysis of Experiments I and II; and Statistical Methods in Research I and II. A course in technical writing and a course in management (personnel and fiscal) are desired.

An HP-41CV calculator with STAT PAC should be provided and Mr. Maliro should be required to demonstrate his proficiency in analyzing most experimental designs with this calculator.

Attendance of an annual meeting of the American Society of Agronomy is recommended. Mr. Maliro is encouraged to present a paper at this meeting on his thesis research.

P.H. Mnyenyembe

Recommended for an M.Sc. in Agronomy emphasizing plant breeding. Mr. Mnyenyembe requires training under the supervision of a wheat breeder whose major effort is varietal development. His thesis research should be field-oriented and should have direct application to his research in Malawi. He is expected to complete his degree in two years.

Suggested courses include: Advanced Genetics; Plant Breeding Techniques I, II, and III; Principles of Breeding Self-Pollinated Crops; Principles of Breeding Cross-Pollinated Crops; Statistical Methods I and II; and Experimental Designs. A course in technical writing and a course in management (personnel and fiscal) are desired.

An HP-41CV calculator with STAT PAC should be provided and Mr. Mnyenyembe should be required to demonstrate his proficiency in analyzing most experimental designs with this calculator.

Attendance of an annual meeting of the American Society of Agronomy is recommended. Mr. Mnyenyembe is encouraged to present a paper at this meeting on his thesis research.

H.D.C. Msiska

Recommended for training to an M.Sc. degree in Range Science. Upon his return, Mr. Msiska will share responsibility for pasture/range management research with another researcher who has a Ph.D. degree in Pasture Agronomy.

Suggested course work should include: Range and Resource Management, Ecology and Land Uses, Grazing Management and Range Nutrition, Range Research Methods, Range Economics, Range Grasses and Grasslands and Statistical Methods. His research should be applicable to range management problems he will encounter upon his return to Malawi.

An HP-41CV calculator, with STAT PAC, should be provided for Mr. Msiska's training program, and he should become thoroughly familiar with this calculator during his training period.

Attendance at a professional meeting on Range Management is recommended to provide the experience of attending a professional meeting and to provide contacts with professionals in his field. The M.Sc. program should be completed within a period of 24 months.

A.P. Mtukuso

Recommended for training to an M.Sc. degree in Animal Science with emphasis on Small Ruminant Production and with some course work in Poultry Production. Upon his return, Mr. Mtukuso will be responsible for the goat, sheep and poultry research programs in Malawi.

Suggested course work should include: Agricultural Biochemistry, Animal Nutrition, Computer Programing, Endocrinology, Genetics of Livestock Improvement, Physiology of Reproduction, Physiology of Egg Laying, Poultry Nutrition, Poultry Production, Sheep Production and Statistical Methods.

An HP-41CV calculator, with STAT PAC, should be provided for Mr. Mtukuso's training program, and he should become thoroughly familiar with this calculator during his training program.

Attendance at an annual meeting of the American Society of Animal Science is recommended to provide the experience of attending a professional meeting and to provide contacts with professionals in his field. The M.Sc. program should be completed within a period of 24 months.

D.D. Nkhoma

Recommended for an M.Sc. in Soil Science emphasizing Soil Chemistry. Ms. Nkhoma requires training under the supervision of a researcher with extensive experience in Tropical Soils. Her thesis research should have direct application to her research in Malawi. She is expected to complete her degree in two years.

Suggested courses include: soil physics; soil analysis; soil chemistry; soil biochemistry and microbiology; soil fertility and plant nutrition; soil genesis, classification and morphology; environmental and pollution aspects of soil science; statistical

methods; and experimental designs. A course in technical writing and a course in management (personnel and fiscal) are recommended.

An HP-41CV calculator with STAT PAC should be provided and Ms. Nkhoma should be required to demonstrate her proficiency in analyzing experimental designs with this calculator.

Attendance of a professional meeting of Soil Scientists is recommended to provide the experience of attending such a meeting and to provide contacts with professionals in her field. Ms. Nkhoma is encouraged to present a paper on her thesis research at this meeting.

B.S.C. Phiri

Recommended for an M.Sc. in Food and Resource Economics emphasizing Farm Management and FSR/E. Mr. Phiri requires training under the supervision of an agricultural economist whose major effort is applied and farmer-oriented. His thesis research should have some practical application to his work in Malawi which will be multidisciplinary in nature and field-oriented to solving the constraints of smallholder farmers. He is expected to complete his degree in two years.

Mr. Phiri requires a good grounding in Farm Management Economics. Courses in the economics of agricultural production, economic development and agriculture, rural welfare and development, design and analysis of field trials, selection of criteria to determine research priorities, and the theory of economic development are also desirable. A course in technical writing and a course in management (personnel and fiscal) are recommended. Courses, from other departments, relevant to agricultural production of smallholder farmers might be useful.

An HP-41CV calculator with STAT PAC should be provided and Mr. Phiri should be required to demonstrate his proficiency in analyzing experimental designs with this calculator.

Attendance of an annual meeting of the American Agricultural Economics Association or a national FSR Workshop is recommended. Mr. Phiri is encouraged to present a paper on his thesis research at this meeting.

APPENDIX C

FINANCES

Table 1. Transactions, University of Florida-IFAS Account October, November and December 1983

Date	Transaction	Check #	Debits (MK)	Credits (MK)	Balance (MK)
Oct. 1					51,017.96
4	McCloud, Per Diem	25035	1779.13		
5	Check #496			6.71	
21	Mrs. Arnold, Med Evac, RSA	25035	341.47		
	DEPOSIT - Officer in Charge			70.00	
	Pervis, Reimbursement	25037	10.19		
	Gray, Per Diem	25038	443.81		
	Pervis, Per Diem	25039	34.23		
	Arnold, Accommodations	25040	132.82		
	Securitor, Bvumbwe	25041	76.46		
	Securitor, Chitedze	25041	611.69		
	Utilities, Electricity	25042	407.27		
	Telephone	25042	10.25		
	Freight, Commodities	25043	36.88		
26	McCloud, Per Diem	25045	303.12		
	Pervis, Per Diem	25046	153.63		
Nov. 2	Luhanga, Travel Advance, RSA	25047	715.00		
	Kantikana, Travel Advance, RSA	25048	715.00		
3	Securitor, Chitedze	25049	592.00		
	Securitor, Bvumbwe	25049	74.00		
	Utilities, Water	25050	607.30		
	McCloud, Accommodations	25051	37.15		
	Utilities, Electricity	25052	262.12		
	Telexes	25053	93.20		
	Mwandemere, Ticket, USA	25053	491.00		
	Freight, Elec. Voltmeter	25053	19.15		
	Arnold, Ticket, Lilongwe	25053	97.00		
	McCloud, Ticket, Blantyre	25053	114.00		
	Fasley, Ticket, Blantyre	25053	97.00		
	Arnold, Ticket, Lilongwe	25053	207.00		
	Freight, Calculators	25053	23.64		
	Janicki, Ticket, Blantyre	25053	97.00		
	McCloud, Ticket, Muzu	25053	79.00		
	Pervis, Ticket, Blantyre	25053	97.00		
	Freight, Moisture Testers	25053	35.09		
15	Nyirenda, Travel Advance, U.K.	25054	500.00		
21	Freight, Soil Testing Equip.	25057	150.71		
	Utilities, Electricity	25058	4.32		
	Freight, Micrometers	25059	618.80		
	Telexes	25059	190.40		
	Luhanga, Ticket, RSA	25059	735.50		
	Kantikana, Ticket, RSA	25059	735.50		
	Freight, Computer Supplies	25059	130.87		
	Freight, Scales	25059	31.16		
	Freight, Commodities	25059	207.69		
	Freight, Projector	25059	31.59		
	Freight, Lab Equipment	25059	31.59		
	Freight, Wheat Seed	25059	31.16		

Table 1. Transactions, University of Florida-IFAS Account October, November and December 1983

Date	Transaction	Check #	Debits (MK)	Credits (MK)	Balance (MK)
Nov 23	Arnold, Per Die	25061	966.29		
29	Arnold, School Fees	25062	509.35		
Dec. 2	Phiri, Visa Reimbursement	25063	3.00		
	Mnyenyembe, Visa Reimbursement	25064	3.00		
	Nyondo, Visa Reimbursement	25065	3.00		
	Arnold, Soche Tours, R & R	25066	5231.00		
5	Securicor, Evuabwe	25067	78.92		
	Securicor, Chitedze	25067	631.35		
	Utilities, Electricity	25068	304.78		
	Utilities, Water	25069	339.98		
	Telexes	25070	138.60		
	Pasley, Ticket, Harare	25070	273.50		
	Freight, Lab Equipment	25070	19.16		
	Pasley, Ticket, Blantyre	25070	87.00		
	Eng, Ticket, Blantyre	25070	87.00		
	Arnold, Ticket, Mzuzu	25070	228.00		
	Marlowe, Ticket, Mzuzu	25070	228.00		
12	Maliro, Passport Reimbursement	25071	6.25		
	Zimba, Passport Reimbursement	25072	15.00		
	Msiska, Travel Advance, USA	25073	637.50		
15	Munyenyembe, Cholera Reimbursement	25074	1.50		
16	Kuwamenda, Travel Advance, USA	25075	637.50		
	Nyondo, Cholera Reimbursement	25076	3.00		
19	Purchase of Sheep	25077	500.00		
20	Mtukuso, Travel Advance, USA	25078	577.54		
	Maliro, Travel Advance, USA	25079	595.34		
	DEPOSIT - Zambesi			309.79	
21	Nkhoa, Travel Advance, USA	25080	637.50		
23	Phiri, Travel Advance, USA	25081	637.50		
	Mnyenyembe, Travel Advance, USA	25082	637.50		
	Chiyembekeza, Travel Advance, USA	25083	584.54		
28	Air Malawi, Additional Fare, Students	25084	1152.50		
	Utilities, Electricity	25085	151.18		
	AMI Rennie, Arnold Travel, Ethiopia	25086	1702.97		
29	Phiri, Photo Reimbursement	25087	2.00		
	Nyondo, Photo Reimbursement	25088	3.00		
	DEPOSIT - Sheep Reimbursement			500.00	
	Ledger Fee		6.84		
TOTALS			29,942.99	886.50	22,051.39
Bank Balance 12/31/83			26,305.07	Checkbook Balance 10/1/83	51,017.86
Outstanding Checks 12/31/83			4,243.69	Credits 10/1/83 - 12/31/83	886.50
BANK BALANCE 12/31/83			22,061.39	Debits 10/1/83 - 12/31/83	29,942.99
				CHECKBOOK BALANCE 12/31/83	22,061.39

Table 2. Summary of Expenditures from the University of Florida Local Account by Program
October 1 to December 31, 1983

Program	Expenditure This Period	Expenditure To Date
	MK	MK
Maize, Breeding and Agronomy	370.50	15,568.32
Groundnut, Breeding and Agronomy	2,332.40	10,042.94
Pasture Agronomy	--	16,780.62
Livestock	1,300.55	42,744.27
Wheat	31.16	31.16
Horticulture, Fruits and Vegetables	4,198.77	17,927.71
Agricultural Economics	295.05	9,280.63
Farming Systems	97.00	15,100.40
Soil Fertility	35.09	8,646.65
Research Coordination	--	15,228.21
Library	--	1,670.62
Participant Training	6,137.17	24,446.17
In-service Training	3,892.00	62,861.12
Overhead *	11,213.40	128,419.37
Total	29,336.14	371,499.79

* Not assignable by program.

APPENDIX D

Summary of Contents of Selected Publications

For complete texts of the publications, consult the files of the UF/USAID/MA Project Office at Chitedze Agricultural Research Station.

1. *Economic Analyses of Some Irrigation Experiments Conducted by Kasinthula Research Station, 1982 (preliminary)*. D.W. Pervis and E. Barak. December 1983. 47 pages.

Experiments analyzed: yield response of irrigated maize to N P K fertilizers; yield response of irrigated maize to various weed control options; economic analysis of the response of irrigated sunflower to three levels of nitrogen; yield responses of five varieties of irrigated wheat to three levels of nitrogen; yield response of irrigated maize (MH12) to seven levels of nitrogen application; yield responses of two irrigated maize varieties to different planting dates; yield responses of various combinations of irrigated maize - bean intercropping treatments; use of pan evaporation data to estimate the irrigation water requirement of maize; response of irrigated maize to various levels of nitrogen application; effects of irrigation frequency on the yields of three varieties of irrigated maize; use of pan evaporation data to estimate the irrigation requirements of wheat; effect of different combinations of nitrogen application and water supply on wheat; response of three wheat varieties to different frequencies of irrigation; use of pan evaporation data to estimate the water requirements of beans.

2. *Experimental Techniques Course -- With Emphasis on the HP-41 Calculator*. D.E. McCloud, L.J. Janicki, F.W. Kisyombe and Wm. Stephens. October 1983. 5 pages.

Part I: Steps to be followed in planning, designing, and conducting an experiment.

Part II: Hands-on experience with the HP-41C calculator and demonstration of its use for conversion and analysis of research data.

3. *Nitrogen Rates on Maize 1978-79*. D.E. McCloud. November 1983. 4 pages.

Data from numerous maize nitrogen rate trials analyzed, using regression, to determine the magnitude of the nitrogen response. 225 trials were analyzed, covering more than 60 locations and including the following varieties: SRS2, PNR353, UCA, CCA, MH12, MH13, and Tuxpeno 1. The results indicate an overall regression of 25.3 kg of maize per kg of nitrogen.

4. *Nitrogen Rates on Maize 1976-77.* D.E. McCloud. December 1983. 2 pages.

Trials used three levels of nitrogen (0, 84, 168 kg/ha) and five varieties of maize (SR52, SV28, R200, CCA, UCA). 55 trials covering 18 locations were analyzed, using linear regression, with results indicating an overall regression of 25.2 kg of maize (cob weight) per kg of nitrogen.

5. *A Report on an Economic Analysis of Three Experiments Yielding Estimated Demand Functions for Irrigation Water on Maize, Wheat and Beans in the Lower Shire Valley of Malawi (preliminary).* D.W. Pervis and E. Barak. November 1983. 10 pages.

Maize variety MH12 was tested with five levels of water application under three levels of frequency. Optimal results were achieved with 509 mm of water (frequency N/A) which yielded 7518 kg/ha. Wheat variety 69/12A1 was tested with five levels of water application under three levels of frequency. Optimal results were achieved with 418 mm of water applied in 6-8 irrigations which yielded 2298 kg/ha. Dwarf bean variety 253/1 was tested with five levels of water application under three levels of frequency. Optimal results occurred with 205 mm of water divided among 3-4 applications which yielded 1972 kg/ha.

6. *Proceedings of the Second In-service Adaptive Research Training Workshop, 10-14 October, 1983.* Edited by L.J. Janicki and R.S. Bolt, Adaptive Research Section, Chitedze ARS. 39 pages.

For each of three areas of Malawi, the farming systems were described and problem areas identified. Alternate ways of addressing each problem were listed. Potential technical interventions were discussed to determine whether sufficient technical information existed to support their inclusion in adaptive on-farm trials. The accepted interventions were then screened for profitability, systems compatibility, and risk. The final output of the Workshop was the design of four types of trials, all of which were related to priority problems and designed to be consistent with the farming systems in a given area.