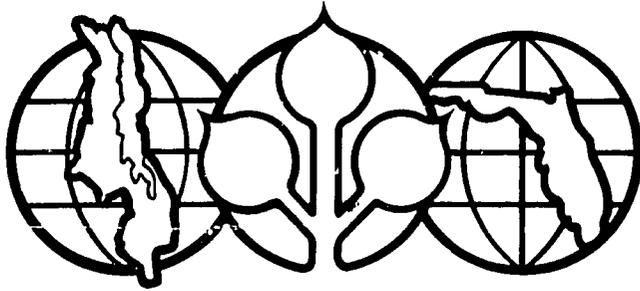


PRM-0202-



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

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QUARTERLY REPORT

July August, September

1983

Project No. AFR 06 612-0202

Contract No. AID/afr-C-1653 (Malawi)

MP - 13

Table of Contents:

I. INTRODUCTION.....	1
II. HIGHLIGHTS.....	1
III. PROJECT INPUTS.....	2
IV. TRAINING	
Participant Training.....	3
In-service Training	3
V. RESEARCH	
General.....	5
Horticulture.....	5
Livestock.....	5
Adaptive Research.....	6
Agricultural Economics	6
Crop Physiology	6
VI. TRAVEL AND MEETINGS	7
Arnold.....	7
Gray	7
Janicki	7
McCloud	7
Pauley	8
Pervis.....	8
VII. ADMINISTRATION	9
VIII. FINANCIAL.....	9
IX. PUBLICATIONS.....	9

List of Tables and Appendixes

Appendix A Training.....	10
Table 1 Participant Training.....	10
Table 2 In-service Training.....	11
Appendix B Financial.....	12
Table 1 Transactions, Florida - IFAS Account.....	12
Table 2 Expenditure by program.....	14
Appendix C Publications.....	15
Table 1 Broudnut and Kylar Study.....	15
Table 2 Maize Time of Planting	17
Table 3 Plant Spacing Study.....	19

I. Introduction

This is the thirteenth quarterly report and covers the second quarter of the 1984 Malawi fiscal year, July-September 1983.

II. Highlights

The UF/USAID/MA Technical Assistance Team continued discussions with the IADS consultants regarding reorganization of the Department of Agricultural Research (DAR) and establishment of linkages between Extension and Research. A Research Strategy Plan and the Master Plan for reorganization were finalized.

Mr. Chilembwe returned to the horticulture program at Bvumbwe after successfully completing a Master's degree program at Florida. He is the first trainee funded by the project to complete a graduate degree.

An Apple II Plus computer was installed at Bvumbwe and a training course given on its usage.

The "Groundnut Top" feeding trial for steers, conducted by Mr. A.P. Mtukuso, was completed near the end of the quarter.

Due to inadequate funds, research operations at Dzalanyama Ranch ceased on August 1, 1983. However, 200 head of two-year old heifers will be made available from the Ranch for the 1983-84 and 1984-85 season Grazing Trials.

Dr. Gray completed the revision and update, begun by Dr. Hodges, of the "Pasture Handbook for Malawi".

Dr. Janicki introduced the Adaptive Research Pilot Program at a workshop for selected professional staff members of the DAR and the Department of Agriculture. The formation of three Adaptive Research Teams (ART's) was discussed and potential team members identified.

Two follow-up courses on the use of the HP 41-CV calculator were given by Dr. McCloud at Bvumbwe in September. The courses were designed to demonstrate the additional capacity of the HP 41-CV calculator compared to the HP 41C model, and to introduce the Apple II computer for more complex experimental designs.

The DAR, at the end of the quarter, selected the final participant trainees for advanced study in the U.S., and the Technical Assistance Team helped them prepare applications to graduate school.

Dr. Pervis initiated collaborative research between Agricultural Economics and Irrigation Agronomy at Kasinthula.

IV. Training

Participant

Mr. Chilembwe from the Bvumbwe ARS, completed his M.Sc. in Fruit Crops at the University of Florida and returned to Malawi. He is the first participant trainee funded by the Project to complete a graduate degree.

The DAR, at the end of the quarter, selected the final participant trainees for advanced study in the U.S. They were assisted in preparing their applications by the Technical Assistance Team, and are scheduled to begin their studies in January 1984.

See Appendix A, page 10, for a list of current participants and their programs.

In-Service

Dr. Pervis presented a seminar on simplified programming to Agricultural Economics and Farming Systems (Adaptive Research) personnel.

A Cereals Workshop was held at Chitedze, 25-26 August. Researchers from each research station, management and extension personnel from each Development Division, and staff from Bunda College of Agriculture presented papers on cereal research and production.

Two follow-up courses on the use of the HP 41-CV calculator were presented by Dr. McCloud at Bvumbwe in September to 30 participants. The courses reviewed the previous HP 41C course and demonstrated the additional capacity of the HP 41-CV. He also instructed the staff there in the use of the Apple II computer. See Appendix A, page 11, for a list of the participants.

In conjunction with the USAID/CIMMYT/East Africa Program, Dr. Janicki held a three day workshop (3-5 August) at the LADD training center in Lilongwe to introduce the Adaptive Research Pilot Program to selected professional staff members of the DAR and DOA. Details of an 18 month in-country training program and a tentative schedule of visits by the CIMMYT Training Team were discussed and agreed upon.

Dr. Janicki also began a series of Saturday seminars on the use of the Apple computer for members of the Adaptive Research Section. Future seminars are planned dealing with the use of VISICALC, Apple Plot, and Data Factory software packages.

Instruction in use of the Apple II computer was presented at Bvumbwe by Dr. Arnold. In addition, he is developing in-service training programs to improve the research capabilities of Professional Officers in horticulture.

D^r. Gray assisted Mr. H.D.C. Msiska in preparing a paper "The Implications of Agroforestry in Livestock Nutrition in Malawi" which was presented at the Workshop on Agroforestry in July. He also assisted Mr. M.S.L. Kumwenda in preparing a paper "Smallholder Dairy Development in Malawi" which was presented at the Workshop on Potential for Small Scale Dairy Cattle Production in Eastern and Southern Africa, held in Nairobi in September.

V. Research

General

The Local Preparation Team assisted by consultants from IADS, finalized: the Master Plan for the Reorganization of the Department of Agricultural Research (DAR); a Research Strategy Plan; and a Project Preparation Document for an Agricultural Research Project. These documents will be presented to potential donors for funding of the next Agricultural Research Project.

Horticulture

Dr. Arnold participated in a meeting of the Tree Nut Association research committee. For Macadamia, priority research needs identified by the growers are fertilization, irrigation and evaluation of new clones from Hawaii and Australia. Dr. Arnold also coordinated a tomato nematode trial with Mr. Daudi, and ordered new cultivars and selections of cashew, pecan, peach, nectarine, and strawberry from researchers in Brazil and Florida.

He assisted Mr. Tembwe in designing new "date of planting" experiments for carnations and chrysanthemums, and coordinated preparation of a list of major cultivars and selections of horticulture crops in Malawi for FAO to facilitate better exchange of plant material between African countries.

Dr. Arnold completed a manuscript on peach fruit abscission for publication in the Journal of the American Society for Horticultural Science.

Livestock

The "Groundnut Top" feeding trial conducted by Mr. A.P. Mtukuso was completed at the end of the quarter. Economic comparison was made between finishing steers fed madeya and groundnut tops, and steers fed madeya-leucaena with groundnut tops for roughage. Madeya gave 16 percent higher gross margins than madeya-leucaena because of the higher cost of the latter.

The poultry project comparing two breeds (Black Australorp vs. Shaver hybrids) and two rations (commercial vs. home mixed) continued. The hens began laying in August and had reached 70 percent production by late September.

Dr. Gray began a swine artificial insemination program at Mikolongwe Veterinary Station. The program will bring critically needed new genetic material into Malawi for distribution to smallholder farmers.

Adaptive Research

Dr. Janicki devoted much of the quarter to establishing the three Adaptive Research Teams (ART's) as proposed in the Adaptive Research Pilot Program of the DAR. Team members were identified and arrangements were made to relocate some of the personnel to the Chitedze Research Station. During August and September the three teams conducted exploratory surveys in Thiwi/Lifidzi, Dowa West and Ntcheu projects, the results of which will form the basis for a CIMMYT-sponsored workshop scheduled in October at Chitedze.

Agricultural Economics

Dr. Pervis continued to supervise counterparts in preparing fuller documentation of the Agricultural Economics Data Bank, and a portion of a publication entitled "Profitable Maize Growing" was completed.

Drs. Pervis and Janicki surveyed farmers in Thiwi Lifidzi in order to provide economic input to the work being done by the ART in LADD.

Dr. Pervis obtained considerable amount of agronomic information on irrigated crops for economic analysis during visits to Kasinthula and Ngabu.

Crop Physiology

Dr. McCloud continued to refine data from the "Groundnut Kylar Study" and revised the preliminary conclusions regarding projected yield and cost benefits. On Chalimbana with 1 kg Kylar per hectare, the yield increase was 570 kg per hectare. With 50% grade A at 55 tambala per kg, and 50% grade B at 30 tambala per kg, the increased return from Kylar would be K242.25 per hectare. Cost of Kylar in the U.S. is K41 per kg. Even at double the U.S. price, the return in Malawi over chemical cost would be K160 per hectare.

VI. Travel and Meetings

- Arnold** Participated in meeting of the Tree Nut Association research committee at Naming'omba Estate.
- Presented a paper, co-authored with Mr. Tembwe, titled "Deciduous Fruit Cultivar Evaluations in Malawi" at the 9th Africa Horticultural Symposium in the Seychelles.
- Met with Drs. Leon Hesser and Fred Nichols to discuss facility needs at Bvumbwe and reorganization of the DAR.
- Gray** Assisted with plans to close research operations at Dzalanyama Ranch and relocate personnel.
- Attended annual meeting of the American Society of Animal Science at Washington State University in July.
- In September, went to Nairobi for the "Workshop on Potential for Small Scale Dairy Cattle Production in Eastern and Southern Africa."
- Made several visits to Chitala ARS to review its programs and assist with budget requests for 1984-85.
- Janicki** Traveled to the Liwonde ADD and to Bvumbwe to discuss the Adaptive Research Programme being implemented this year.
- Participated in exploratory surveys being done in Dowa West, Thiwi/Lifidzi and Ntcheu.
- Participated as a resource person at the CIMMYT-sponsored Farming Systems Workshop held in Harare, Zimbabwe, September 5-16. Dr. Janicki lectured on the on-farm experimentation sequence and the statistical design and analysis of on-farm trials.
- McCloud** Presented two courses at Bvumbwe on the use of the HP 41-CV calculator.
- While on annual leave, traveled to the Peoples Republic of China in July as a participant in an Agronomy Delegation at the invitation of the China Agronomy Society.
- Prepared in-service training courses for the Agricultural Research Project at the University of Florida.
- In August, attended the American Society of Agronomy meetings held in Washington, D.C.
- At the Bvumbwe Research Station, installed the Apple II computer and conducted training courses for the staff.

Pasley Numerous meetings were attended regarding the Reorganization of the DAR and development of a Research Strategy Plan and Project Preparation Document for an Agricultural Research Project.
Made a presentation on the reorganization of Malawi's DAR at the Southern African Regional Workshop on Agricultural Research and Training in Harare.

Hosted and participated in a Cereals Workshop at Chitedze on August 25th and 26th.

Pervis In August, attended annual meeting of the American Agricultural Economics Association at Purdue University.

Met with Mr. Jere, LADD Evaluation Officer, to demonstrate VISICALC, A-STAT and other computer software.

A meeting with Mr. Bolt was held to discuss the effect of DAR reorganization on the Agricultural Economics Section at Chitedze.

Participated in Adaptive Research informed survey at Thiwi Lifidzi.

Visited Kasinthula and Ngabu regarding collaborative research.

Met several times with Dr. Hesser of IADS to discuss the role of Ag Econ in the reorganization of the DAR and in Adaptive Research.

Met with the ad hoc Data Bank Subcommittee regarding software for the Burroughs Data Bank operations and approval from the Ministry Data Processing Committee for the DAR headquarters to link with the Ministry's Burroughs minicomputer.

Met with Mr. Nick Thorsen and Mr. Bombaji regarding the revolving fertilizer credit to be set up by the World Bank and IFAD.

Met Mr. Rene Doherty of USAID regarding economic conditions in Malawi generally and pricing in particular.

VII. Administration

With inputs from the DAR, USAID/MA, IP-UF and the Technical Assistance Team, a compromise budget was prepared for the Malawi Agricultural Research Project through the life of the project. With this budget, reallocation of funds can be made to accomplish priority project objectives.

Numerous administrative matters pertaining to the project were processed, but will not be itemized here.

VIII. Finances

See Appendix B, Tables 1 and 2, for a summary of Project financial transactions.

IX. Publications

Project Objective: Issuance of research publications -- as recommendations on which extension publications can be released to smallholders; or research journal publications.

1. Groundnut Kylar Study, D.E. McCloud and C.E. Maliro, September 1983. See Appendix C, page 15.
2. Maize Time of Planting, D.E. McCloud and L.D.M. Ngwira, September 1983. See Appendix C, page 17.
3. Plant Spacing Study, D.E. McCloud, C.E. Maliro and P.H. Mnyenyembe, September 1983. See Appendix C, page 19.

APPENDIX A

Table 1

PARTICIPANT TRAINING QUARTERLY REPORT
July 1 to September 30, 1983

Name	Training	Degree Program	Station	Departure	Months Accumulated	Due Back	Funded To
Chapola G.M.	Plant Pathology	Ph.D.	Bvuabwe	Dec 80	33	Apr 84	Jun 84
Chigwe C.F.B.	Sorghum Breeding	Ph.D.	Makoka	Dec 81	21	Dec 84	Jun 85
Chikwana R.	Agricultural Economics	M.S.	Chitedze	Dec 80	33	Dec 82	Jan 84
Chipala E.E.	Soybean Breeding	Ph.D.	Chitedze	Dec 80	33	Dec 83	Jun 84
Chiremba, A.B.M.	Statistics	M.S.	Makoka	Dec 82	9	Dec 84	Dec 84
Dzowela B.H.	Pasture Agronomy	Ph.D.	Chitedze	Dec 80	33	Jun 84	Jun 84
Badabu, A.D.	Entomology	Ph.D.	Bvuabwe	Dec 82	9	Dec 84	Dec 84
Gondwe M.T.	Vegetable Crops	M.S.	Bvuabwe	Dec 81	21	Dec 83	Jun 84
Khonje D.J.	Soil Microbiology	Ph.D.	Chitedze	Dec 81	21	Dec 84	Jun 85
Kisyombe, C.T.	Plant Pathology	M.S.	Chitedze	Dec 82	9	Dec 84	Dec 84
Mkamanga B.Y.	Crop Physiology	Ph.D.	Chitedze	Dec 80	33	Jun 84	Jun 84
Mtambo P.J.	Seed Technology	M.S.	Chitedze	Dec 81	21	Dec 83	Jun 85
Munthali, F.	Wheat Agronomy	M.S.	Chitedze	Dec 82	9	Dec 84	Jun 85
Munthali J.T.K.	Animal Nutrition	Ph.D.	Chitedze	Dec 80	33	Dec 83	Jun 84
Mwango, E.N.	Anthropology	M.A.	Chitedze	Dec 82	9	Dec 84	Dec 84
Mzeabe C.P.	Irrigation Agronomy	M.S.	Kasinthula	Dec 80	33	Jun 84	Jun 84
Ngwira L.D.H.	Maize Agronomy	M.S.	Chitedze	Dec 81	21	May 84	Jun 84
Nthakomwa, B.	Agric. Economics	M.S.	Chitedze	Dec 82	9	Dec 84	Dec 84
Ntokotha E.M.	Soil Survey	Ph.D.	Lilongwe	Dec 80	33	Jun 84	Jun 84
Saka A.L.	Soil Physics	Ph.D.	Bvuabwe	Dec 80	33	Dec 83	Jun 84
Sibale P.K.	Groundnut Breeding	Ph.D.	Chitedze	Dec 82	33	Jun 84	Jun 84
Zambezi B.T.	Maize Breeding	M.S.	Chitedze	Jun 81	28	Dec 83	Dec 84

Table 2

IN-SERVICE TRAINING QUARTERLY REPORT
July 1 to September 30, 1983

Following are lists of those attending the two courses on the use of HP-41CV Calculator. All except those indicated are from Bvumbwe.

September 26-27, 1983

1. R.C. Kuwenda (Mrs)	T.O.
2. R.A. Nsanjama (Mrs)	T.O.
3. Z.Y. Chilema	C.T.O.
4. D.D. Nkhoma (Miss)	T.O.
5. M.N. Nsanjama	T.O.
6. I.M.G. Phiri	T.O.
7. E.H.C. Chilembwe	P.O.
8. W.R.Y. Kuwenda	T.O.
9. P.P. Panje	P.O.
10. B.P. Mbundungu	T.O.
11. B.S. Kambale	T.O.
12. D.C. Kalizang'osa	T.O.
13. S.D.T. Phiri	T.O.**
14. C.J. Kamanga	T.O.
15. V. Mhango	T.O.
16. R.J. Phiri	T.O.
17. L.S. Nkolosa	T.O.
18. E.S. Mwalu	T.O.

* From Kasinthula

** From Ngabu

September 28-29, 1983

1. J.W. Chingani	S.T.A.
2. C.L. Choabo	S.T.A.
3. E.R. Kaunda	S.T.A.
4. D.D. Mainjeni	T.O.
5. W.P.G. Banda	T.O.
6. L.S.M. Mumba*	S.T.O.
7. C.E.D. Mainjeni (Mrs)	T.O.
8. E.N. Chickweta	T.O.
9. C.T. Chizala	P.O.
10. F.E. Kadwa*	T.O.
11. L. Chisenga	T.O.
12. B.C. Chimaliro	S.T.A.

APPENDIX B

FINANCIAL

Table 1. Transactions, University of Florida-UFAS Account July, August and September 1983

Date	Transaction	Check#	Debits (MK)	Credits (MK)	Balance (MK)
July 1					9,643.43
12	Electricity Chitedze	2459	307.48		
	Securicor, Bvumbwe	2460	76.46		
	Electricity, Bvumbwe	2461	160.36		
15	Arnold, Travel Advance	2462	500.00		
19	K. Janicki, Med. Evac.	2463	1,494.50		
	M. Janicki, R & R	2464	682.50		
	Janicki, Per Diem	2465	619.05		
	Janicki, Telephone Installation	2465	162.02		
	Pasley, Per Diem	2465	375.58		
20	Fan Repair	2466	15.00		
	DEPOSIT - UF			1,671.00	
	Bank Fee		6.96		
22	Chitedze Rest House	2469	70.00		
28	Janicki, School Travel	2470	250.74		
	Arnold, School Travel	2472	544.49		
	Arnold, School Fees	2473	1,325.00		
	Pasley, Telephone Installation and Bill	2474	295.00		
	Arnold, Settling-in Allowance	2475	53.73		
	E. Sibale, Per Diem RSA	2476	25.25		
	J. Kuwenda, Per Diem RSA	2477	25.26		
	W. Nhlane, Per Diem RSA	2478	25.26		
Aug. 3	Electricity, Chitedze	2479	362.92		
	Securicor, Chitedze	2480	693.06		
	McCloud, Accommodation Bvumbwe	2481	13.25		
	T. Kalinga, In-service Training	2483	20.13		
	Cash, In-service	2484	10.26		
8	DEPOSIT - UF			27,022.85	
	DEPOSIT - UF			20,444.91	
	DEPOSIT - UF			18,737.65	
	DEPOSIT - UF			9,133.77	
11	Securicor, Chitedze	2495	732.42		
	F. Kisyonbe, In-service Training	2496	52.25		
	In-service Accommodations	2498	381.00		
	In-service Accommodations	2489	150.00		
	LLW Hotel, In-service Accommodations	2490	517.51		
17	SON, 11th Reimbursement	2491	23,145.87		
22	Arnold, Settling-in Allowance	2492	271.50		
29	McCloud, Per Diem	2493	500.00		
Sept 1	Utilities Water, Chitedze	2494	250.15		
	Electricity, Bvumbwe	2495	123.83		
	Securicor, Bvumbwe	2496	74.00		
	Manica - Freight, Telexes, Airline Ticket	2497	950.00		
2	Janicki, Travel Advance	2498	1,080.00		
	DEPOSIT - Chilembwe			1,915.09	
	DEPOSIT - UF			4,324.45	

Table 1. Transactions, University of Florida-IFAS Account July, August and September 1983

Date	Transaction	Check#	Debits(MK)	Credits(MK)	Balance(MK)
Sept 6	LLW Hotel, Corrale Workshop	2499	157.09		
8	J. Ndongu, Per Diem	2500	16.55		
	W. Kawonga, Per Diem	25001	16.55		
	G. Bulla, Per Diem	25002	16.55		
	B. Phiri, Per Diem	25003	16.55		
	O. Jera, Per Diem	25004	16.55		
	J. Nyondo, Per Diem	25005	15.55		
9	Arnold, Per Diem	25006	462.68		
12	DEPOSIT - UF			18,965.04	
	C. Matabwa, Per Diem	25008	22.02		
	Pervis, Per Diem	25009	25.91		
	Janicki, Per Diem	25010	6.69		
	Gray, Per Diem	25012	78.40		
	Gray, Reimbursement Expenses	25013	93.74		
	Gray, Travel Advance	25014	512.00		
	Pervis, Reimbursement Computer Parts	25015	465.92		
	Pasley, Per Diem	25016	104.72		
	Pasley, Per Diem	25017	36.12		
13	McCloud, Reimbursement Supplies	25018	3.48		
	Securicor, Chitedze	25019	592.00		
	Census Book	25020	5.00		
	Glens Removals, Freight Commodities	25021	44.31		
14	McCloud, Per Diem	25022	1,335.93		
	J. Kaunda, Travel Advance	25023	180.00		
22	Janicki, Per Diem	25024	9.24		
	Gray, Per Diem	25025	118.28		
	G. Bulla, Per Diem	25026	.56		
	B. Phiri, Per Diem	25028	.56		
	W. Kawonga, Per Diem	25029	.56		
	Check Books		12.00		
23	J. Kaunda, Per Diem	25030	5.35		
	Arnold, Per Diem	25031	65.40		
28	McCloud, Supplies Reimbursement	25032	56.39		
	Manica - Telexes, Tickets, Freight	25034	1,240.86		
	Bank Fee		9.15		
	Erroneous Deposit		18,740.15 *		
	Check #496		6.71		
TOTALS			60,840.33	102,214.76	51,017.86

* A check for \$16,689.98 from Chase Manhattan Bank was mistakenly credited twice to our account. Once was on May 25, 1983 (at the exchange rate of .8999: MK 18,567.11 less MK 2.50 service charge = MK 18,564.61) and again on July 4 (at the exchange rate of .8906: MK 18,740.15 less MK 2.50 service charge = MK 18,737.65). When the bank realized its error, our account was debited MK 18,740.15. We are attempting to recover the MK 2.50 difference.

Bank Balance 9/30/83	51,319.65	Checkbook Balance 7/1/83	9,643.43
Outstanding Checks 9/30/83	301.79	Credits 7/1/83 - 9/30/83	102,214.76
		Debits 7/1/83 - 9/30/83	60,840.33
-----		-----	
BALANCE 9/30/83	51,017.86	CHECKBOOK BALANCE 9/30/83	51,017.86

Table 2. Summary of Expenditure from the University of Florida Local Account by Programs
July 1 to September 30, 1983

Program	Expenditure This Period	Expenditure To Date
	MK	MK
Maize, Breeding and Agronomy	140.84	15,197.82
Broundnut, Breeding and Agronomy	1,953.36	7,710.54
Pasture Agronomy	--	16,780.62
Livestock	1,300.56	42,744.27
Horticulture, Fruits and Vegetables	1,926.83	13,728.94
Agricultural Economics	496.83	8,985.58
Farming Systems	1,934.00	16,003.40
Soil Fertility	441.80	8,631.56
Research Coordination	375.58	16,226.21
Library	--	1,670.62
Participant Training	--	24,446.17
In-service Training	209.02	52,831.95
Overhead *	10,187.91	117,205.97
Total	18,936.73	342,163.65

* Not assignable by programs.

APPENDIX C
PUBLICATIONS

Groundnut Kylar Study

D.E. McCloud and C.E. Maliro

Previous work from this project has shown that Chalimbana has a relatively low partitioning of assimilates to pods compared to Mani Pintar. The question is can Chalimbana yields be increased with Kylar? In 1981, with Mr. Maliro, I initiated an experiment to test this hypothesis. The objective was to determine if pod numbers, and ultimately yields can be increased using the growth regulator Kylar. The first Kylar experiment was grown during the 1981-82 season. As a result of poor stands and late planting the results were inconclusive.

The Kylar experiment was run again during the 1982-83 season. Planting was made December 10, 1982, emergence was December 16th and flowering began January 25, 1983. Weekly harvests were begun on January 14, 1983 (25 days after emergence) and continued until May 27 (158 days after emergence). A total of 20 harvests were taken. Kylar was applied on January 31st and February 4th. Tables 1 and 2 present the data taken.

Several preliminary conclusions can be drawn from this experiment:

1. Kylar increased the pod numbers in Mani Pintar by 15.8%, while for Chalimbana the increase was 33.7%. This increase for Chalimbana was predicted since this variety has a low partitioning of assimilates to pods.
2. Final yields of Mani Pintar were increased 9.0% by Kylar, while the increase for Chalimbana was 33.5%. These increases were expected based on the increased pod numbers.
3. On Chalimbana with 1 kg Kylar per hectare the yield increase was 570 kg per ha. With 50% grade A @ 55 tambala per kg, and 50% grade B @ 30 tambala per kg, the increased return from Kylar would be K242.25 per hectare. Cost of Kylar in the U.S. is K41 per kg. Even at double U.S. Kylar costs, for Malawi the return over chemical cost would be K160 per hectare.

Table 1 Days from emergence, ground cover, pod load, vegetative dry matter and pod dry matter for the KYLAR 82 experiment for Mani Pintar.

Day	Mani Pintar check				Mani Pintar kylar			
	Ground cover	Pod load	Vegetative dry matter	Pod dry matter	Ground cover	Pod load	Vegetative dry matter	Pod dry matter
25	28.8		850		28.9		850	
32	43.8		1,550		46.2		1,510	
39	60.0		2,180		62.8		2,290	
46	70.0		3,230		70.0		3,180	
53	83.8		4,370		83.8		4,520	
60	100.0		5,270		100.0		5,300	
67		6.0	6,010	320		6.7	5,960	450
74		9.8	6,690	490		14.3	6,600	690
81		11.6	7,560	950		19.5	6,790	1,180
88		11.6	8,490	1,540		14.7	6,300	1,780
95		17.7	7,180	2,230		15.2	6,350	2,450
102		18.0	7,550	2,830		25.0	6,310	3,220
109		24.9	6,500	3,190		27.2	5,850	3,680
116		24.0	6,660	2,790		27.5	5,330	3,110
123		27.4	6,060	3,020		32.1	4,650	3,040
130		23.7	5,820	3,250		26.3	4,640	3,370
137		27.2	5,620	3,270		31.8	4,490	3,420
144		21.9	3,880	3,320		29.7	4,750	3,690
151		23.6	5,280	3,910		25.8	4,330	4,260
158		22.8	5,020	3,400		30.4	3,940	3,600

Table 2 Days from emergence, ground cover, pod load, vegetative dry matter and pod dry matter for the KYLAR 82 experiment for Chaliabana.

Day	Chaliabana check				Chaliabana kylar			
	Ground cover	Pod load	Vegetative dry matter	Pod dry matter	Ground cover	Pod load	Vegetative dry matter	Pod dry matter
25	43.8		1,230		43.9		1,150	
32	55.0		2,190		52.5		2,020	
39	77.5		3,120		79.8		3,170	
46	90.0		4,180		90.0		4,150	
53	95.0		4,950		92.5		4,940	
60	100.0		5,570		100.0		5,300	
67		1.4	6,310	40		2.2	6,040	150
74		1.6	7,230	60		6.2	6,780	270
81		2.6	7,020	240		7.7	6,160	570
88		2.6	7,316	700		5.8	6,810	1,020
95		4.0	7,170	1,170		9.9	5,860	1,650
102		6.9	6,290	1,550		8.7	5,700	2,310
109		8.1	6,140	1,740		12.1	5,500	2,230
116		7.0	6,170	1,630		9.4	4,960	2,190
123		7.4	5,480	1,630		12.2	4,520	2,140
130		8.4	5,080	1,540		9.9	4,680	2,570
137		8.0	4,830	1,920		9.4	4,830	2,060
144		8.4	4,780	2,500		10.6	4,360	2,760
151		8.9	4,300	2,300		11.2	3,780	3,070
158		8.0	4,130	2,070		11.1	3,910	2,530

Maize Time of Planting

D.E. McCloud and L.D.M. Ngwira

Maize research conducted during the period 1964-78 analyzed by Mr. L.D.M. Ngwira show a highly significant reduction in yield related to the date of planting. I have analyzed these data, using regression, to determine the magnitude of the yield reduction. Complete data is shown in Table 1. Conclusions from this analysis are as follows:

There is a severe reduction in maize yields with delayed planting amounting to 50 to 150 kg/ha for each day planting is delayed after the first rains come. Thus, it costs the farmer K6.50 to 19.50 per day in reduced maize yields to delay planting after the rains come. The common extension recommendation to delay planting because of the possibility of cob rot is very costly.

SUMMARY

Location	Treatment	Number of trials	Average yield kg ha ⁻¹	Yield loss kg ha ⁻¹ da ⁻¹	r ²
Baka	Rainfed	10	7,722	- 154.4	0.92
Bembeke	Rainfed	1	2,359	- 27.8	0.94
Bvumbwe	Rainfed	1	6,101	- 53.8	0.90
Chitala	Rainfed	1	3,173	- 47.4	0.90
Chitedze	Rainfed	9	6,012	- 80.3	0.96
Chitedze	Irrigated	4	7,582	- 42.7	0.91
Lupembe	Rainfed	5	6,694	- 130.6	0.93

Table 1 Malawi Time of Planting Maize Trials (1964-78)* Regression Analysis Calculated by D. E. McCloud

Station	Variety-Treatment	Year	Maximum Yield kg ha ⁻¹	Planting dates	Slope kg ha ⁻¹ da ⁻¹	Correlation
Bvumbwe	Mthenga (LH7) Rainfed	64-65	6,101	7	- 53.8	0.90
Chitedze	Askani (SV17) Rainfed	67-68	6,588	4	- 44.1	0.98
Chitedze	SCK1 (single cross) Rainfed	68-69	7,034	4	- 74.6	0.91
Chitedze	Katwani B Rainfed	68-69	6,225	4	- 113.2	0.91
Chitedze	Katwani B Irrigated	68-69	7,843	4	- 35.9	0.92
Chitedze	Katwani B No spray	68-69	6,995	4	- 86.3	0.97
Chitedze	Katwani B Spray zineb+DDT	68-69	7,181	4	- 62.9	0.78
Chitedze	Katwani B N ⁶⁰	68-69	7,039	4	- 70.9	0.88
Chitedze	Katwani B N ⁷⁰	68-69	7,029	4	- 78.3	0.93
Chitedze	Katwani B Rainfed	68-69	5,642	4	- 60.3	0.98
Chitedze	Katwani B Irrigated throughout	68-69	7,775	4	- 34.0	0.98
Chitedze	Katwani B Irrigated at flowering	68-69	7,283	4	- 19.7	0.51**
Chitedze	Katwani B Irrigated after flowering	68-69	7,731	4	- 68.2	0.98
Chitedze	Katwani B N ⁶⁰	68-69	6,995	4	- 45.2	1.00
Chitedze	Katwani B N ⁷⁰	68-69	7,049	4	- 45.9	0.98
Chitedze	Katwani B Rainfed	68-69	5,316	4	- 43.1	0.97

Station	Variety-Treatment	Year	Maximum Yield kg ha ⁻¹	Planting dates	Slope kg ha ⁻¹ da ⁻¹	Correlation r ²
Chitedze	Katumani B Irrigated throughout	68-69	5,669	4	- 7.9	0.14**
Chitedze	Katumani B Rainfed	69-70	6,592	4	- 101.7	0.07
Chitedze	Katumani B Irrigated throughout	69-70	8,544	4	- 57.2	0.84
Chitedze	Katumani B No spray	69-70	7,784	4	- 94.9	0.94
Chitedze	Katumani B Spray zineb+DDT	69-70	7,351	4	- 64.0	0.93
Chitedze	Katumani B N ¹⁰⁰	69-70	7,522	4	- 84.2	0.94
Chitedze	Katumani B N ¹⁰⁰	69-70	7,513	4	- 74.7	0.94
Chitala	Katumani B Irrigated	69-70	1,302	4	- 17.6	0.70**
Chitala	Katumani B Irrigated throughout	69-70	2,875	4	- 3.5	0.01**
Chitala	Katumani B No spray	69-70	1,627	4	- 8.0	0.19**
Chitala	Katumani B Spray zineb+DDT	69-70	2,604	4	- 13.1	0.13**
Chitala	Katumani B N ¹⁰⁰	69-70	1,899	4	- 1.7	0.00**
Chitala	Katumani B N ¹⁰⁰	69-70	2,279	4	- 8.6	0.09**
Chitedze	SCK1 rainfed	69-70	6,185	4	- 104.1	0.99
Chitedze	SCK1 irrigated throughout	69-70	7,541	4	- 11.2	0.37**
Chitedze	SCK1 no spray	69-70	7,595	4	- 36.8	0.68**
Chitedze	SCK1 spray zineb+DDT	69-70	7,784	4	- 106.6	0.99
Chitedze	SCK1 N ¹⁰⁰	69-70	7,270	4	- 64.8	0.96
Chitedze	SCK1 N ¹⁰⁰	69-70	7,297	4	- 65.0	0.97
Chitedze	Katumani B N ¹⁰⁰ rainfed	69-70	5,597	4	- 70.1	0.99
Chitedze	Katumani B N ¹⁰⁰ irrigated	69-70	5,967	4	- 43.6	0.99
Chitedze	Katumani B N ¹⁰⁰ rainfed	69-70	8,099	4	- 109.1	0.95
Chitala	Katumani B Rainfed	69-70	3,173	4	- 47.4	0.90
Bembeke	Katumani B Rainfed	69-70	2,359	4	- 27.8	0.94
Lupembe	SR 52 Rainfed	77-78	5,770	5	- 114.1	0.91
Lupembe	R 201 Rainfed	77-78	6,443	5	- 116.5	0.93
Lupembe	CCB Rainfed	77-78	7,137	5	- 136.5	0.95
Lupembe	CCA Rainfed	77-78	6,134	5	- 117.2	0.91
Lupembe	PNR95 Rainfed	77-78	7,986	4	- 168.6	0.94
Baka	SR 52 Rainfed	73-74	6,173	5	- 42.4	0.24**
Baka	R 200 Rainfed	73-74	5,185	4	- 40.0	0.83
Baka	SV28 Rainfed	73-74	5,463	5	- 55.7	0.39**
Baka	SR 52 Rainfed	75-76	8,395	5	- 173.7	0.93
Baka	R 200 Rainfed	75-76	6,019	5	- 122.9	0.91
Baka	SV28 Rainfed	75-76	6,451	5	- 131.1	0.92
Baka	SR 52 Rainfed	77-78	7,639	4	- 182.3	0.97
Baka	R 201 Rainfed	77-78	10,224	4	- 234.4	0.93
Baka	CCB Rainfed	77-78	10,802	4	- 255.6	0.94
Baka	CCA Rainfed	77-78	5,603	4	- 138.7	0.86
Baka	PNR95 Rainfed	77-78	9,192	4	- 218.4	0.97

* FRCI: A Review of Maize Time of Planting Experiments Conducted in Malawi (1964-79)
L.D.M. Ngwira Chitedze Research Station

Plant Spacing Study

D.E. M^cCloud, C.E. Maliro and P.H. Mnyenyembe

The question is how much variability is introduced in field experiments by the variability associated with **handmade** planting. I discussed this with Mr. Maliro, groundnut agronomist, and Mr. Mnyenyembe, maize-wheat agronomist, and we designed a series of experiments to measure this variability. We took 1,200 measurements in six different locations, at Chitedze and in farmer's fields. This can be compared to samples taken from **tractor-planted** maize at Chitedze. The Farming Systems group, had taken fourteen similar samples from different farmers in two villages. Also, several years ago, I took a similar set of data in a Florida **tractor-planted** soybean field. More complete data is found in Table 1. The results are presented as follows:

SUMMARY

Description	Crop	Type	Mean	CV%
Farmer planted	Maize	Between rows	91.4	10.1
Farmer planted	Maize	Within row	78.0	12.3
Farmer planted	Groundnut	Between rows	93.8	8.5
Farmer planted	Groundnut	Within row	17.8	24.6
Research planted	Groundnut	Between rows	23.2	7.7
Research planted	Groundnut	Within row	15.8	7.3
Tractor planted	Maize	Between rows	88.0	9.7
Tractor planted	Maize	Within row	26.3	48.5
Tractor planted ^a	Soybean	Between rows	23.3	6.0
Tractor planted	Soybean	Within row	15.7	7.0

^a Data taken in Florida

Several conclusions can be drawn from this data:

1. Farmer made ridges are somewhat more variable, CV 8 to 10% than tractor made rows in the US, CV 6%. The difference is however, less than one would expect.
2. Tractor made ridges in Malawi are not different from farmer made ridges.
3. Farmer made within row plant spacing is more variable than between row spacing, CV's 7 to 25%.
4. Within the row tractor plant spacing in Malawi is extremely variable, 48% compared to Florida 7%.

Table 1 Measurements of between row widths and within row plant spacings at Chitedze and in farmer's fields

Location	Crop	Type	Observations										Overall
			1	2	3	4	5	6	7	8	9	10	
			-- cm --										
LADD ^o U44	Maize	BR											
		Avg	98.2	99.7	96.4	98.4	88.9	94.3	89.7	96.1	95.1	87.1	92.5
		S D	9.16	2.58	6.87	8.33	5.47	3.89	7.53	5.53	3.81	5.13	7.55
		CV%	9.33	2.85	7.12	8.46	6.15	4.61	8.39	5.75	4.01	5.89	8.17
LADD ^o U44	Maize	WR											
		Avg	52.4	53.1	52.3	54.0	50.5	60.5	60.0	44.3	72.3	69.0	56.9
		S D	4.38	4.31	3.19	6.15	6.96	4.97	4.92	4.37	5.89	2.21	9.43
		CV%	8.35	8.11	6.00	11.38	13.79	8.22	9.20	9.87	8.14	3.02	16.56
NSARU ^o VxT	Groundnut	BR											
		Avg	96.5	92.2	88.9	96.4	87.2	104.3	85.9	94.8	87.0	101.1	93.4
		S D	5.30	6.39	4.77	7.54	4.96	6.82	5.93	6.92	5.74	7.06	8.43
		CV%	5.49	6.93	5.37	7.83	5.69	6.54	6.91	7.30	6.55	6.99	9.02
NSARU ^o VxT	Groundnut	WR											
		Avg	19.3	20.6	17.7	18.2	16.1	16.7	18.5	19.4	18.7	15.1	18.0
		S D	5.49	10.16	6.24	2.30	5.22	1.34	2.22	2.50	2.95	2.47	4.87
		CV%	28.38	49.30	35.24	12.64	32.40	8.01	12.55	12.90	15.75	16.36	26.99
Nsaruf	Maize	BR											
		Avg	93.2	102.0	94.0	99.9	96.1	98.5	86.6	71.7	83.3	101.1	91.6
		S D	6.51	8.07	4.55	7.94	15.39	9.90	13.99	4.64	8.68	5.11	12.54
		CV%	6.99	7.91	4.84	7.94	16.01	11.19	16.16	6.48	10.42	5.05	13.68
Nsaruf	Maize	WR											
		Avg	66.4	72.8	72.0	72.5	71.3	71.9	72.1	71.4	76.8	77.6	72.5
		S D	18.13	6.53	6.29	6.02	4.74	7.28	9.11	8.54	15.68	17.04	10.91
		CV%	27.30	8.97	8.74	8.31	6.65	10.12	12.63	11.96	20.41	21.96	15.05
LADD ^o U44 VxT	Groundnut	BR											
		Avg	94.0	92.6	85.4	102.5	98.2	95.6	82.6	99.8	93.5	97.0	94.1
		S D	5.92	5.28	5.62	4.93	5.45	3.47	4.99	3.42	4.01	4.37	7.46
		CV%	6.30	5.70	6.58	4.81	5.55	3.63	6.04	3.43	4.28	4.51	7.92
LADD ^o U44 VxT	Groundnut	WR											
		Avg	16.4	20.2	16.3	15.9	15.4	17.8	19.1	18.8	17.1	18.3	17.5
		S D	2.32	3.26	2.67	2.81	1.26	5.65	4.20	5.86	4.72	2.16	3.91
		CV%	14.14	16.13	16.37	17.65	8.21	31.76	22.00	31.20	27.63	11.82	22.30
Chitedze ^o GB	Groundnut	BR											
		Avg	24.6	23.4	20.4	22.2	24.8	23.6	22.0	23.9	23.5	23.5	23.2
		S D	1.11	1.16	2.05	1.20	1.18	0.80	0.96	1.96	1.43	0.91	1.79
		CV%	4.52	4.97	10.05	5.43	4.78	3.39	4.34	8.18	6.10	3.88	7.72
Chitedze ^o GB	Groundnut	WR											
		Avg	15.7	16.3	16.0	15.6	15.9	15.7	16.1	15.5	15.5	15.6	15.8
		S D	1.08	0.98	1.16	1.08	1.72	1.48	1.30	0.88	0.88	0.94	1.15
		CV%	6.91	5.00	7.31	6.89	10.83	9.40	8.07	5.69	5.69	6.01	7.30
Chitedze ^o MP	Maize	BR											
		Avg	93.5	92.6	85.8	72.5	87.9	89.7	88.1	98.8	84.5	96.8	88.0
		S D	4.90	3.86	6.68	3.81	2.33	5.44	3.54	7.18	4.88	5.22	8.52
		CV%	5.87	4.17	7.79	5.25	2.65	6.06	4.02	7.26	5.78	5.40	9.68

Location	Crop	Type	Observations										Overall
			1	2	3	4	5	6	7	8	9	10	
Chitedze ^a MP	Maize	NR											
		Avg	34.8	22.9	26.3	21.3	31.8	16.3	20.5	27.4	29.0	32.7	26.3
		S D	19.87	7.82	6.75	4.26	20.00	10.09	11.34	10.36	10.57	8.06	12.76
		CVZ	57.17	34.17	25.66	19.97	62.80	61.77	55.30	37.90	36.43	24.66	48.50
Chitedze EW (g)	Maize	NR											
		Avg	274.6	207.6	249.9	245.2	256.5	213.8	248.0	267.4	201.6	176.4	234.0
		S D	66.6	62.7	56.8	120.6	105.3	94.17	79.3	101.2	77.2	40.8	85.6
		CVZ	24.24	30.20	22.83	49.17	41.05	44.05	31.96	37.96	38.28	23.12	36.57
Nchinji 1 ^a FT	Maize	BR											
		Avg	93.4	91.8	91.2	85.3	90.0	89.0	97.0	91.9	93.5	97.8	91.1
		S D	3.49	3.58	4.34	6.30	2.98	5.87	6.44	6.98	4.87	3.64	5.88
		CVZ	3.74	3.90	4.75	7.39	3.31	6.59	7.40	7.60	5.21	3.72	6.45
Nchinji 2 ^a FT	Maize	BR											
		Avg	88.2	81.5	90.7	86.1	80.1	94.9	83.2	83.2	85.9	83.4	84.8
		S D	6.27	5.61	12.22	9.71	7.27	3.84	5.36	6.41	3.94	7.23	7.55
		CVZ	7.11	6.87	13.47	11.47	9.08	4.53	6.44	7.70	4.53	8.67	8.90
Dowa ^a FT	Maize	BR											
		Avg	84.5	83.7	85.7	81.9	87.3	77.5	87.9	80.3	82.0	91.6	84.2
		S D	9.19	7.57	7.04	5.50	11.52	5.36	6.21	5.40	4.59	6.09	7.84
		CVZ	10.87	9.05	8.22	6.72	13.19	6.92	7.06	6.73	5.60	6.65	9.31
Nasiyaka ^a FS	Maize	BR											
		Avg	106.0	95.9	96.3	103.0	90.0	103.0	99.1				
		S D	7.44	14.9	8.76	7.07	7.56	12.00	10.90				
		CVZ	7.00	15.30	9.10	6.90	8.40	11.70	11.00				
Nasiyaka ^a FS	Maize	NR											
		Avg	85.0	96.9	91.9	89.1	91.3	92.5	90.9				
		S D	7.56	7.04	5.30	3.72	14.60	8.86	8.91				
		CVZ	8.99	7.27	5.77	4.22	16.00	9.58	9.80				
Nyezeler ^a FS	Maize	BR											
		Avg	97.5	100.0	105.0	105.6	93.6	75.8	99.9	96.6			
		S D	7.07	7.56	5.34	10.50	5.04	12.26	9.91	12.46			
		CVZ	7.25	7.56	5.09	9.94	5.38	16.14	10.04	12.90			
Ntezeler ^a FS	Maize	NR											
		Avg	92.5	92.9	96.2	90.0	89.8	88.8	91.2	91.6			
		S D	10.35	3.58	5.18	5.34	6.94	8.76	6.41	7.00			
		CVZ	11.19	3.86	5.38	5.94	7.74	9.87	7.02	7.64			
Florida ^a	Soybean	BR											
		Avg	62.6	59.6	51.8	56.3	62.9	59.8	56.0	60.7	59.7	59.7	59.2
		S D	2.83	2.96	5.21	3.06	3.01	2.03	2.43	4.97	3.64	2.32	3.54
		CVZ	4.52	4.97	10.05	5.45	4.78	3.39	4.34	8.18	6.10	3.88	5.98
Florida ^a	Soybean	NR											
		Avg	39.9	41.4	40.5	39.6	40.3	39.9	40.8	39.4	39.4	39.6	39.8
		S D	2.76	2.48	2.96	2.73	4.36	3.75	3.30	2.24	2.24	2.38	2.78
		CVZ	6.91	6.00	7.31	6.89	10.83	9.40	8.07	5.69	5.69	6.01	6.99

^a Farmer planted

^r Research planted

^t Tractor planted

, Data taken in inches