

PD- AAY-506



AGENCY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF THE  
REPRESENTATIVE TO BURMA

AMERICAN EMBASSY  
RANGOON, BURMA  
November 4, 1988

11/5/88

MEMORANDUM

To: The Files

Through: Earl J. Young, AID Representative *EJY*

From: Gary E. Alex, Asst. Agricultural Development Officer

Subject: Maize and Oilseeds Production Project (MOPP) (482-0005),  
Project Assistance Completion Report

This report is occasioned on the completion of the Maize and Oilseeds Production (MOP) Project and is prepared according to guidance pursuant to A.I.D. Handbook 3, Project Assistance.

11      13-1-17-506

**Project Assistance Completion Report  
Maize and Oilseeds Production Project (482-0005)**

**I. Status of Completion of Project Element**

The MOP Project was essentially complete in all elements and activities by the PACD of 03/31/88. Technical assistance activities were completed, as were training activities except for six degree participants whose programs will be finished under the follow-on Burma Agriculture Production Project (482-0007). Township production program work is complete but will continue with slightly different focus under the follow-on project. Rhizobium production will move to a new facility at Maymyo, but work has been completed as planned. Major project activity yet to be completed relates to establishment of four seed farms. For these, irrigation, drainage and land leveling is still required; farms must be brought under full production; and a transformer must be replaced at the Chaungmagyi Farm. Remaining seed farm development work will also be supported by the follow on project.

It may be noted that the follow-on project has been designed not because the MOP Project did not complete planned activities, but because the project was judged so successful by Burmese government and USAID that it was desired to continue and expand activities.

**II. Summary of Contributions**

**A. GOB Contribution to the Project (Ks Million)**

	<u>Planned</u>	<u>Actual</u>
Fertilizer	72.0	48.1
Equipment	11.2	27.7
Operating Costs	57.9	35.4
Construction	15.4	27.9
	<u>156.5</u>	<u>139.1</u>

(US\$ 19,319,444 equivalent at Ks 7.2/US\$1)

**B. US Dollar Grant Contribution (US\$ 000)**

	<u>\$ Planned</u>	<u>\$ Actual</u>
Fertilizer	15,000	17,315
Technical Assistance	2,400	3,120
Training	3,000	1,544
Equipment	5,000	6,073
Evaluation	100	132
Contingency Reserve	4,500	-
	<u>\$ 30,000</u>	<u>\$ 28,184</u>

C. US local Currency Grant Contribution (Ks 000)

	<u>Planned</u>	<u>Actual</u>
Research Institute Costs	4,819.0	4,819.0
Applied Research Dept. Costs	10,670.0	10,670.0
Extension Costs	62,272.7	62,272.7
	<u>77,716.7</u>	<u>77,716.7</u>

(US \$ 10,794,000 equivalent at Ks 7.2/US\$ 1)

D. Total Project Financial Contribution

	<u>(\$ 000)</u>	<u>%</u>
US Dollar Grant	28,184	48.4
GOB Contribution	19,319	33.1
U.S. Local Currency Grant	10,794	18.5
	<u>58,297</u>	<u>100.0</u>

III. Review of Accomplishments

A. Project Goal and Purpose:

The sector or program goal for MOPP was "to increase production of oilseed crops and maize in 28 townships of rural Burma, with positive effects on rural income and employment and on national food supply and nutrition."

The project purpose was "to bring about a rapid rate of adoption of high yielding inputs and tillage practices among farmers planting maize and oilseed crops in 28 project townships."

The goal and purpose of the project were to be achieved through extension to farmers of ten technology components. These were: (1) use of improved higher-yielding seed varieties; (2) proper land preparation; (3) plant density; (4) use of organic manure; (5) use of chemical fertilizer; (6) pest and disease control; (7) sowing techniques; (8) weed control; (9) timely harvesting; and (10) irrigation/water management practices.

The accomplishment of increased production of maize and oilseeds using the above ten components of the technology package was to be achieved through a comprehensive program, including technical assistance, training (long and short-term), provision of agricultural machinery and equipment, and fertilizer procurement.

In addition to production targets, the Project Grant Agreement also cited the following institutional development outputs: (1) improved national research capability in maize and oilseeds; (2) introduction of improved maize and oilseed technology and production practices;

(3) four fully-equipped and staffed seed farms; (4) an operational farm management system for monitoring farm level production practices and providing feed-back on results to research and extension centers; (5) returned trainees in place within the research, extension, seed farm, and fertilizer distribution elements of the project; and (6) a functional rhizobium production facility (inoculum for groundnuts and soybeans).

The project was intended to have both direct and indirect spread effects. It was anticipated that producers in 28 townships would be the direct beneficiaries. Additional groundnut and soybean producers would be indirect beneficiaries through the receipt of improved seed inoculum. An additional 1.5 million acres (groundnut producers outside the project) would be a sizeable indirect benefit from the distribution of project produced inoculum only.

The project final evaluation concluded that the MOP Project was highly successful. A total of 95,600 farm families (approx. 493,000 persons) participated in the project and directly benefitted. Production goals were largely achieved and gross farm income was increased by \$ 225 million.

#### B. Project Outputs:

The Project Grant Agreement proposed that a total of 36 participants should receive long-term training to attain graduate degrees (25 MS and 11 Ph.D.). The first group for MS training did not leave Burma until June 1983, which was nearly two years after then project started. Twenty two persons were sent to the U.S. for MS training and two for the Ph.D. degree. With the exception of Ph.D.s, the long-term training goals were nearly met. The Agricultural Corporation has done an excellent job of placing the returnees in positions of responsibility appropriate to their areas of training.

Provisions were made in the Project Agreement for 70 Burmese to participate in short-term training programs of two to six months, involving study, observation and learning new techniques for improved production. A total of 58 participants participated in 22 short term training programs overseas. Several other planned courses were cancelled because of delays in nomination of candidates. In-country training was an important part of the project. Considerable on-the-job training was provided by technical assistance personnel, mainly in equipment use and maintenance, pesticide use, and research trial establishment. In addition, approximately 33 semi-formal, short courses were presented, benefiting a total of over 831 attendees.

Technical assistance was provided by MUCIA (Midwest Universities Consortium for International Activities, Inc.) and various other contracts for short term consultants. Long-term advisors provided 9.8 of the planned 13 person years of assistance in agronomy, seed technology and water management. Eighteen short-term consultants provided a total of approximately 34 person months of assistance in a

variety of fields, but with concentration on agricultural engineering and farm development. In addition, frequent visits by the Procurement Services Agent, administrative visits from MUCIA and monitoring by USAID project managers provided additional technical assistance.

MOPP was to develop four fully equipped and staffed seed farms for the production of foundation and certified seed. Two of these, the Chaungmagyi and Sebin Seed Farms, were designated to produce foundation seed, on 110 acres for maize and 70 acres for oilseeds, while the Kyaungsu and Thitcho Seed Farms were designated to produce certified seed from foundation seed, on 3,000 acres of maize and 800 acres of oilseeds. All of the seed farms are administered under the Extension Division of the Agriculture Corporation, Ministry of Agriculture and Forests.

A major investment was made to equip the seed farms. The Project Paper specified that a total of \$2.9 million should be allocated for seed farm equipment. The Project Grant Agreement specified that approximately \$5 million should be allocated for machinery and equipment for seed farms, seed processing facilities, a rhizobium production facility, research equipment for the Agricultural Research Institute, water pumps and related equipment, extension demonstration equipment, and costs of procurement. By the PACD \$6.1 million had been expended for equipment and commodities.

The Chaungmagyi Seed Farm, selected to produce maize and groundnut foundation seed, is comprised of 350 acres, of which 304 acres can be used for crop production. Nearly all of this has now been developed for crop production. A 1.2 mile-long canal and 4.5 miles of drainage ditches were built; ninety acres of land were rough-leveled; four miles of on-farm roads were constructed; and barbed wire fencing was completed.

Farm staff totals 16, including the farm manager, deputy manager, field inspector, nine field men, two research people, five in seed production, two in seed processing and distribution, two tractor drivers and one office person. Various research trials have been conducted on the Chaungmagyi Seed Farm, including variety trials on maize and groundnuts and fertilizer trials for both crops.

The Sebin Seed Farm, designated as a foundation seed farm, is comprised of 345 acres of which 290 acres are considered cultivable. A 3.04 mile-long canal has been constructed but not completed and still must be lined with cement. The source of water for irrigation is the Thitson Dam, which is about seven miles from the farm. Most of the land has been rough-leveled and a one-mile on-farm road has been constructed. A well was drilled to a depth of 975 feet, but the drill stem was broken and this well is not in use. Research trials conducted at the Sebin Seed Farm include groundnut variety trials, sunflower pollination trials, fertilizer trials for groundnuts and sunflower, and soybean variety and observation trials.

The Kyaungsu Seed Farm is comprised of 880 acres, of which 800 are cultivable. The Kyaungsu Seed Farm was designated as one of the two farms to produce certified seed. Two miles of on-farm road, 0.7 mile of fencing and 2 miles of drainage ditches were completed. No surface water is available and irrigation and drainage remain a problem.

The Thitcho Seed Farm, designated for certified seed, is the largest of all the seed farms involved in the project, having 3,111 acres, at least 2,200 acres of which are cultivable. An eight-mile access road to the farm is still under construction and is not always passable during the monsoon. An on-farm road of 0.5 mile has been constructed and fencing is nearly complete. Several research trials were conducted at the Thitcho Seed Farm on soybeans, maize and sunflowers. The Thitcho farm has drainage problems on some areas. These have been studied but not resolved.

At all farms, physical construction is basically completed with a total of 91 buildings completed. Management of the MOPP farms has improved with each planting season. The seasonal field activities are usually conducted on time. There is a better understanding of machinery operation. Crop management is more thoroughly understood than at the beginning of the project. MUCIA consultants have assisted with machinery use and maintenance, improved operating efficiency and adjustment, as well as maintenance of accurate and comprehensive individual field books and construction of improved fuel storage facilities.

Actual quantity of seed production from the seed farms fell far below original targets due to delays in establishment of farms, shortages of diesel fuel for cultivation and changes in crop mix on farms as cropping systems were revised for the farms to better conform to requirements of soil and climatic conditions. Seed production was as follows:

	<u>PP Target (MT)</u>	<u>Actual (MT)</u>
Groundnut	NA	355
Maize	NA	2091
Sesame	NA	19
Sunflower	NA	256
Soybean	NA	
Others		
	<u>9,000</u>	<u>2,721</u>

The principal objective of MOPP was to increase production of maize and other oilseed crops, particularly groundnuts, sesame and sunflower, in 28 townships (geographically, 26 townships) of Burma.

Sesame has been one of Burma's most important crops for many years, second only to rice. In 1981, oilseed crops, principally sesame and groundnuts, comprised approximately 19.5% of the total sown acreage in

Burma. Maize has been grown mostly for direct consumption, and it has been only in the past few years that sunflowers have gained any significance, having been introduced into Burma only in the 1970s.

Total on-farm production increases for the project were:

	<u>PP Target (MT)</u>	<u>Actual (MT)</u>
Groundnut	87,000	125,000
Maize	228,000	228,638
Sesame	25,000	36,399
Sunflower	53,000	55,056

In addition to the 87,000MT increased groundnut production to be attributable directly to project acres, a further 171,000 MT increase is indirectly attributable to other groundnut acreage throughout Burma because of the spread of rhizobium inoculation technology.

Approximately 1.2 million acres were involved directly in the project, and an additional 1.5 million acres are believed to have benefited from the spread effects of nitrogen-fixing rhizobium inoculation technology on groundnuts and soybeans.

The established acreage goals for the targeted oilseed crops, as stated in the Project Paper, were:

	<u>PP Target (Acres)</u>	<u>Actual (Acres)</u>
Maize	373,200	416,031
Groundnut	388,000	485,174
Sesame	312,200	385,961
Sunflower	115,400	166,225
Total	<u>1,188,800 Acres</u>	<u>1,453,391 Acres</u>

Extension efforts were focused on eight "intensive" townships which had highest potential for increasing production and which received maximum possible input and on 20 extensive townships which received lesser amounts of inputs. In all cases these acreage goals were surpassed.

Maize was targeted in six intensive townships in the Mandalay, Sagaing and Irrawaddy Divisions, with a target area of 105,000 acres; also, two extensive townships in the Sagaing and Pegu Divisions were targeted for 24,400 acres.

Three intensive townships in the Mandalay, Pegu and Irrawaddy Divisions, having a total acre of 50,000 acres, were designated as target areas for groundnuts, as well as five extensive townships in the Mandalay, Pegu, Sagaing and Magwe Divisions.

Sesame was targeted for an area of 40,000 acres in one intensive township in the Irrawaddy Division, as well as a total area of 54,000 acres in four extensive townships of the Irrawaddy Division and two extensive townships in the Mandalay Division.

The target areas for sunflowers included two intensive townships in Mandalay Division, one extensive township in Sagaing Division and two extensive townships in Pegu Division, having a total of 44,000 acres.

Production increase targets were equalled or surpassed for all four crops. Total acreage harvested and total yields for maize, groundnuts, sesame and sunflower increased steadily since the beginning of the MOPP in 1982. Average per acre yields of oilseed crops also increased throughout the Project. The appropriateness of project technology imported and modified for Burmese conditions is amply demonstrated by this. While acreage has expanded and production has increased for the project commodities, there are still technical production problems that need to be recognized and overcome. These are being addressed by the follow-on project.

One of the objectives of technical assistance was to meet an urgent need for applied research to expand data bases regarding fertilizer needs, optimum plant populations, row spacing and planting dates for project crops. Considerable effort was expended in this regard. The most useful research results were those for maize and sunflower. Sesame results were limited and of no immediate application. The most useful groundnut data pertained to fertilizer use and varietal performance. Sunflower trials included seed storage, plant populations, various fertilizer component applications, methods of fertilizer applications, weed control, pollination methods, varietal evaluations, and tillage and planting methods.

The intent of this research was to obtain practical data that would be of immediate use to the MOPP farms and townships. These research efforts included varietal, fertilizer, plant population, weed control, tillage systems, pollination and planting methods trials. The research activities produced some concrete answers to questions, but as so often happens in research, solving one unknown generated questions involving several more problems. Recent trials (1986-87) were more successful because they were simplified and because research personnel on the farms took greater care to reduce experimental error by controlling technician error. The project's most useful information was obtained from 84 experiments conducted during the last 24 months.

Research on rhizobium was conducted at the Agricultural Research Institute (ARI) at Yezin. Rhizobia were isolated under laboratory conditions and inoculums for groundnuts and cowpeas rhizobia were developed. It was demonstrated that peat inoculum with this rhizobium produced significant increases in yields of chickpeas and mung beans. Yield data for groundnuts is not yet available, but rhizobium usage on groundnuts is well accepted. During the 1981-82 crop season, 60 metric tons of groundnut inoculum and 55 metric tons of chickpea inoculum were distributed to farmers.

The Project Grant Agreement included plans for a functional rhizobium production facility to produce production an estimated 3 million pounds of nitrogen-fixing inoculum per year by year five of the MOP Project. The MOP Project provided the necessary training, equipment

and supplies for a new rhizobium inoculant facility at the Agricultural Research Institute and the total number of 1/2 lb packages of rhizobium produced and distributed during MOPP is shown as follows:

1982-83	763,241
1983-84	656,728
1984-85	606,008
1985-86	640,240
1986-87	690,186

The fact that production of rhizobium has leveled off during the years of MOPP indicates that the capacity of the facility in Yezin has been reached and that plans for development of a new facility at Maymyo need to be implemented.

One of the most important commodities required to reach the objectives of the Project was fertilizer. The Project imported from the U.S.A. approximately 65,000 MT of fertilizer (10,000 MT of urea and 55,000 MT of TSP) for use in project areas, and the government of the Socialist Republic of the Union of Burma provided an additional 36,000 MT. A total of \$23,351,341 was expended for the provision of fertilizer (74%) and project-related equipment (26%). There is very little doubt that the fertilizer provided to MOPP was instrumental in the successful achievement of production goals along with the increased acreage planted to these crops.

#### IV. Progress Toward Achievement of Purpose

The project surpassed each of the tracts set for groundnut, sesame, sunflower and maize. Soybeans were dropped from the project, since the infrastructure to extract soybean oil does not exist in Burma. Production increases exceeded targets for all crops, and project area average yields exceeded national yields for all crops. The project final evaluation team asserted categorically that the project contributed to increased production of the target crops.

These increases are likely to be sustained, the evaluators concluded, since project farmers have come to recognize the technology packages to be superior to traditional methods of production. Increased contact and advice from the Agriculture Corporation extension service contributed to the attainment of project goals. In all meetings between the evaluation team and farmers, there were expressions of the need for more inputs, particularly fertilizer and seeds. There was an obvious good rapport and solid relationship between farmers and the extension service. The government appears committed to maintaining these increases by increasing allocations of fertilizer for groundnut, sesame, and sunflower production and expanding the programs to additional townships. The seed production of the four seed farms, and the seed processing facilities at Sebin and Chaungmagyi, will continue to contribute to increased production of improved oilseeds in Burma after donor funding has terminated.

The ability of the SRUB to finance future commercial imports of fertilizer is uncertain. Maintaining current production levels after the project ends is therefore not guaranteed. The expansion of rhizobium use on groundnuts has taken some pressure off the demand for urea and must be seen as a very positive step.

A second financial concern, of lesser importance, is the SRUB's ability to finance other inputs, such as diesel fuel, spare parts, building materials and other expendables. The SRUB 1986/87 capital budget allocated 12.7% to agriculture, but the current budget allocates only 6.4%.

#### V. Recommendations for Final Adjustment in Project Design

None. Continuation of Project activities is being supported by a follow on project. Changes in seed farm production targets will be made in the context of that project.

#### VI. Continuing AID Monitoring Responsibilities

None. All monitoring responsibilities will be undertaken by follow on project.

#### VII. Review of Data Collection

The final evaluation proposed and initiated work on a socio-economic monitoring system. Work on this is being undertaken by the Burma Agriculture Production Project.

Experience under the MOP Project indicates that the GOB routinely collects very detailed and complete data on production and utilizes this in planning. It is difficult to verify this data but it seems generally reliable. It does not include data that can be used to indicate impact. This is the gap which the monitoring system under the BAPP will attempt to remedy.

#### VIII. Summary of Lessons Learned

##### A. Need for Research Support:

To make valid recommendations for crop production, it was necessary to generate research information for the crops involved. Such information for the target areas is now greater than before based on experimental trials conducted at the MOPP seed farms, at the ARI/Yezin and at the ARD farms at Magwe and other locales in Central Burma. Research trials must continue to be conducted for varieties, fertilizers, weed control, etc., for maize and all the oilseed crops. Fertilizer trials were especially important to determine the optimum usage for obtaining high economical yields. The value of improved varieties and hybrids will be limited unless optimum amounts of

fertilizer can be applied. Research trials also should be continued for improved varieties, and when feasible, hybrids, to determine which will increase production. Finally, research must be carried out to determine the most effective ways to eliminate disease problems and problems caused by insects, rodents and other pests.

#### B. Training:

This component of MOPP was very successful except that there was a shortfall in the number of Ph.D. candidates. Several of the most successful M.S. students trained under MOPP should be sent back for doctoral degrees during BAPP.

Delays in receiving the names of candidates have created problems for USAID and MUCIA in gaining university acceptance for the candidates, as most U.S. universities require that applications be received six months in advance of the registration date. To eliminate this bottleneck, participants for long-term training should be selected and approved two years in advance of planned training programs. Also, an alternate candidate should be named for each applicant in case the designated candidate is not able to begin his studies for any reason.

All candidates for study in the U.S. or elsewhere should take a TOEFL test as soon as they have been selected in order to determine levels of English language proficiency. All candidates for M.S. degrees should be scheduled for 30 months, while Ph.D. candidates should be scheduled for a minimum of 48 months. Even with these time periods, extensions should be made available with approval by the government.

#### C. Clearance of Consultants:

The provision of short-term technical assistance at critical points during the conduct of the Project has been essential to project success. Delays in obtaining clearances for short-term technicians have created problems for MUCIA and the technicians involved, and have made it difficult for MOPP and local MUCIA personnel to arrange schedules so that the technicians could be in Burma at the most appropriate times. In order to obtain the services of well-qualified technicians, clearances must be granted expeditiously, as those who are best qualified often have numerous consulting opportunities and must plan accordingly.

#### D. Seed Farm Management:

Management of the MOPP farms improved with each planting season. The seasonal field activities are now usually done on time and there is a better understanding of machinery operations. Mechanized crop management is now more thoroughly understood.

During the past two years MUCIA consultants made suggestions regarding machinery use and maintenance, improved operation efficiency and adjustment as well as making suggestions about maintenance of accurate and comprehensive individual field books and construction of improved fuel storage facilities. However, the following general and specific suggestions for improvement of farm operation should be followed-up on under the follow-on project:

- Farms should increase fertilizer application amounts, particularly urea.
- Crop rotations should be lengthened at Sebin and Chaungmagyi to discourage buildup of plant diseases.
- As foundation farms, Sebin and Chaungmagyi need to develop long-term soil development rotations which include 4-8 months of a green manure legume on each field every 2-3 years.
- Along with the use of green manure crops, more effort must be put into effective management of crop residue materials at all farms.
- Field size should be increased whenever possible if tractors continue to be used for tillage and planting.
- Farm managers need to become more involved in understanding and supervising equipment adjustment, and tractor operators also need to learn adjustment procedures.
- Translation into Burmese of operator's and maintenance manuals for all of the equipment used should be an immediate objective of BAPP so that all farm personnel can make use of the books.
- Some of the farms need to place more emphasis on timely maintenance.
- Tractor drivers and mechanics must be held responsible for the correct operation of their equipment and tools, including maintenance and repair.
- All farm personnel, including management and administrative type personnel, should be involved in the physical work of day-to-day activities.
- Farms should consider using animal-drawn equipment to a greater extent, especially in view of fuel shortages.
- Farms should develop incentive programs to encourage employees to take a more active interest in the farm's activities and development.
- An active dialogue among the four farms would increase machinery knowledge since some farms have more experience with one particular piece of equipment than do other farms.

E. Project Coordination:

The progress of any project depends on adequate communication among all personnel responsible for implementing the project. Regularly scheduled meetings attended by key personnel are necessary for such communication to take place. Such meetings should be held every quarter and should include USAID, BAPP and technical assistance personnel as well as those senior officers of the Agriculture Corporation who are involved with the Project. Meetings should be scheduled in advance for specific dates and times. For those who are unable to attend, authority should be delegated to a replacement.

F. Shortages of Fuel:

A lack of gasoline had a limiting effect on travel to Project sites at critical times, especially when the technical assistance team was at full force. Funds should be budgeted and arrangements should be made to ensure sufficient gasoline for the foreign technicians and senior BAPP personnel to make at least one trip every month to whatever Project areas are currently most important to those involved. Such trips are especially important during the planting and harvesting seasons, providing opportunities for observation of progress as well as on-the-job training. Sufficient gasoline is also essential for trips for short-term consultants so that they can work to full capacity without delays.

A lack of dependable supplies of diesel fuel has been a continuing critical constraint throughout the life of MOPP. To complete the development of the seed farms this constraint must be alleviated for BAPP.

G. Clearance of Commodities Through Customs:

A major constraint to efficient Project operation has been the inability to expeditiously clear commodities from Customs. Customs formalities and unanticipated duties and taxes have caused many commodities to remain in Customs for varying periods of time up to nine months, although delays of this magnitude decreased in the latter stages of MOPP. Projected time frames for accomplishing many project objectives were extended because of the late delivery of needed commodities. All commodities should be exempt from duties and taxes and arrangements should be made for removing commodities from Customs within one week of arrival into the country. The success of the follow-on BAPP can only be enhanced by such actions.

Clearances:

ADO: DRPickett in draft  
PROG: TJBarker in draft

Distribution:

ANE/DP/EA: JMeenan  
PPC/CDIE/DI: MBrown  
O/FIN: DFranklin  
ADO: DRPickett