PD-AAX-578

PROJECT EVALUATION SUMMARY

1. Mission or AID/W Office Name: USAID/Ethiopia	2. Project Number: 663-0166
3. Project Title: Pulse Diversification and Improvement	
4. Key project dates (fiscal years) a. Project Agreement Signed 1974 b. Final Obligation 1980 c. Final input delivered 1981	5. Total U.S. funding - life of project $2,192,000
6. Evaluation number as listed in Evaluation Schedule 2	7. Period covered by this evaluation From: 7/76 (Month/Year) To: 1/78 (Month/Year)
8. Date of this Evaluation Review 3/9/78 Month/Day/Year	

9. Action Decisions Reached at Evaluation Review, including items needing further study (Note--This list does not constitute an action request to AID/W. Use telegrams, airgrams, SPARS, etc., for action)	10. Officer or Unit responsible for follow-up	11. Date action to be completed
1. Evaluation recommendations for re-structuring project objectives, composition and administration approved by review committee.	RD/AG	-
2. Continued project support of pulse extension activities is contingent upon formulation by extension service of pulse extension program imparting pulse technologies and providing production inputs to small scale farmers in pulse growing areas.	RD/AG	-
3. Project Paper amendment to be prepared for AID/W approval describing re-structured project.	RD/AG	5/78
4. Strengthen effectiveness of technical services and participant training in promoting long-term development objectives.	RD/AG	on-going

12. Signatures:

	Project Officer	Mission or AID/W Office Director
Signature	Peter W. Shirk	
Typed Name	Peter W. Shirk	Princeton Lyman
Date	March 23, 1978	March 23, 1978

E V A L U A T I O N

PULSE DIVERSIFICATION AND IMPROVEMENT

PROJECT No. 663-0166

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JANUARY 1978

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INTRODUCTION

As noted on page 6, of the Pulse Project Paper, an independent evaluation is to be conducted in the second or early in the third year, and the begining of the fifth year to determine whether the pulse project is achieving the objectives as described in the project design. The evaluation is to determine the need for modifications in design or method of implementation, and provide recommendations for applying corrective measures as required.

In addition to the need to periodically assess the performance of project components, this evaluation is particularly important from the perspective of how the overall project implementation methodology and ultimate objectives conform (after three years since the initial project documentation was signed in May of 1974) to the present national development priorities of Ethiopia.

During the last three years new leadership has emerged in Ethiopia which has completely transformed the government and which has directed the country in accordance with the principles of socialism. In addition to a major administrative transformation, the development policies of the new government underwent re-direction reflecting the new ideological orientation. The effect of these changes in development policies and administration on the pulse project will be addressed in this evaluation.

I. BACKGROUND

A. Ethiopian Pulse Production: General

Pulse production in Ethiopia occurs primarily in the northern and central highlands in areas of Eritrea, Tigre, Wollo, Begemdir, Gojjam and Shoa. Pulses are grown on an estimated 900,000 ha. in Ethiopia with an annual production of about 700,000 MT. Pulses occupy about 12% of the total cropped area. The majority of pulses have been grown by small scale farmers who practice traditional production techniques. Until recently there has been little agronomic research work on pulses in Ethiopia. As a result, it has been difficult to provide recommendations on improved cultural practices. Well adapted, high yielding pulse varieties have not been widely available. Thus, per hectare yields of pulse crops have been in the range of six to eight quintals per hectare and the varieties grown are not the varieties which command premium prices in the export market.

Edible pulses, the seeds of food legumes, provide the major source of plant protein and about 8% of the total calories for the human population in Ethiopia. Pulses rank next to cereals, seeds of grasses, in importance. Approximately 85% of all pulse production other than haricots (most of which is produced for export markets) is consumed domestically (see Annex 1, Pulse Exports 1965-1975). Domestic requirements for pulses is expected to increase at about 2.5 to 3% per annum in future years. On the basis of past consumption patterns, domestic demand is expected to center on chickpeas, horsebeans, fieldpeas, and lentils.

B. Rational for Pulse Improvement Program

During the 1960's Ethiopia experienced a steadily declining balance of trade which reached a negative position of over Eth.Birr 166 million in 1968. In 1969 and 1970 this balance of trade position was moderately less unfavorable. Given these circumstances increasing interest was generated in the possibility of producing greater quantities of goods for export. Exports from Ethiopia have been almost wholly agricultural products (over 90%). A study published in 1969[1/] emphasized the potential for future pulse exports. Another 1972[2/] study also described future prospects for considerable increases in pulse production/export. The findings in these studies plus the considered opinions of both GOE and outside source observers led to a recommendation that definitive plans be made to increase the production of pulse crops for export from Ethiopia.

1/ "Ethiopia's Export Trade in Major Agricultural Commodities", Report No. 6, Stanford Research Institute, January 1969.

2/ "The Feasibility of Producing Pulse Crops for Export Markets", Report No. 1, Experience Inc., May 1972.

Although considerable quantities of Ethiopian pulse crops other than the haricotbean, have found their way into the export trade, the bulk of the production of chickpeas, horsebeans, fieldpeas, and lentils is generated by the small scale peasant farming sector primarily for domestic consumption. During early stages in the design of the pulse project, production of these crops was not expected to contribute substantially to increased exports. No significant breakthrough in production of horsebeans, chickpeas, lentils, or fieldpeas was expected. Even with concentrated efforts in research on varietal improvement, production practices, disease and insect control and other factors, there was no assurance of significant increases in production. Conversely, the haricotbean, prior to the implementation of land reform in March 1975, was grown almost exclusively for export by large scale commercial farmers who had the incentive, resources and knowhow to use improved seed and production practices and who could expand or contract areas devoted to crops in accordance with fluctuating markets if it was to their advantage.

The priorities which existed during the planning and early implementation of the project were influenced in part by foreign exchange deficits and the development strategy of the Third Five Year Plan. These priorities are reflected in the Ministry of Agriculture and Settlement, Planning and Programming Department (PPD), Proposal for the Pulse Diversification and Export Promotion Program, published in March 1974. In that proposal (upon which the USAID Project Paper is based), the development strategy was to concentrate program activities, in the early stages, in areas suitable for haricotbean production for export. In the later stages, and as experience was gained with the implementation of various program components, production areas would be expanded to encourage the production and marketing of a greater variety of pulses. Additional influences on the initial direction and thrust of Ethiopian pulse improvement was provided via Experience, [illegible] in their Phase II report of February 1972 to the Ministry of Agriculture and Settlement. This report contained the following Experience, Inc. position statement: "The pulse production project is concerned primarily with a commodity - initially white haricot type beans. Since this project is concerned with the production of commodity for export, rather than the development of an area, a somewhat different type of organization and management is necessary."

There was obviously considerable emphasis on haricot beans for export, during the early stages of this project. That emphasis was in response to Ethiopian Government priorities, as they then existed, and was supported by the findings of several reports conducted by outside consultants.

II. THE PULSE PROJECT: DESIGN AND OBJECTIVES

A. Project Goal

The project description section of the Project Paper specifies: the need to sustain advances in haricot exports; that increasing numbers of small scale farmers should be encouraged to contribute to haricot and other pulse exports; and that programs in market and production diversification should be quickly initiated. Thus described, the project is to have four components: (i) an expanded pulse research and foundation seed production component; (ii) a certified (pure) seed production component; (iii) an extension and delivery system for technology and production inputs component; and (iv) a model marketing system.

Under the summary portion another project description states that the "project intends to provide opportunities for small (scale) farmers to enter and share in an expanding internal and export market for pulses". This intent is to be achieved through emphasis on: (i) research; (ii) linkages to the Minimum Package Program (MPP); (iii) marketing; and (iv) a product nutritionally desirable with high producer prices.

In spite of the existance of a plethora of documented rationale and an apparent desire on the part of Ethiopian policy makers and others to launch a pulse project emphasizing increased and improved haricot production for the export market (as noted in Part II.B. above) the final project design and logical frame work did not specify haricots as the primary objective. Exports and increased foreign exchange earnings are relegated to a secondary goal position. The primary project goals are described as: "increased income of small (scale) farmers; development of IEG (now GOE) institutions in coordination and management of multi-agency projects to assist small (scale) farmers".

B. Project Purpose

The logical framework purpose is: "to achieve increased pulse productivity and overall pulse production support by development of an institutional and infrastructure framework including research, extension, seed multiplication and marketing. Results of these activities will be disseminated through the Minimum Package Program which focuses on small (scale) farmer clientele".

The conditions that will indicate by the end of the project, that the purpose has been achieved (EOPS):

1. Ongoing expanded pulse research program in IAR closely tied to the requirements for seed varieties and production technology as identified jointly by IAR and EPID.

2. A viable, efficient pulse seed multiplication and distribution program functioning under auspices of EPID.

3. An ongoing relevant extension officer training program in pulses in place.

4. An operational pulse marketing system functioning.

5. EPID extension system providing 12,000 farmers with technical information on pulses production.

C. Project Outputs

Outputs designed to result in achievement of the above end-of-project-status were designated under the Institute of Agricultural Research (IAR), EPID, and a marketing component:

1. Institute of Agricultural Research (IAR)

(a) Establishment of pulse research laboratory and field testing unit.

(b) Development of higher yielding better adapted pulse varieties.

(c) Recommendation for improved cultural practices to obtain higher yields.

(d) Trained resident staff.

2. EPID/MPP

(a) Extension of improved technology and provision of appropriate production inputs to small farmers.

(b) Effective farmer utilization of EPID extension system.

(c) Seed multiplied.

(d) Seed and other package inputs distributed to participating farmers.

(e) Trained staff.

3. Marketing

(a) An established pulse marketing system.

(b) Marketing plan designed and pilot marketing system established.

(c) Trained staff.

D. Project Inputs

1. USA.I.D. financed inputs per project design totalling U.S.$2,583,000 for the five year life of project.

	US$
(a) Technical Assistance Personnel (LT)	1,878,238
(1) Production Agronomist - Team Leader	
(2) Plant Breeder	
(3) Plant Pathologist	
(4) Seed Processing Specialist	
(5) Marketing Specialist	
(b) Consultants (ST)	
(1) Technical	
(2) Training	
(3) Research	
(c) Commodities	282,500
(1) IAR	
Vehicles Farm Tractors & Equipment Office Machines Research Equipment Seed Handling Equipment	
(2) EPID	
Vehicles & Bicycles Office Machines Research Equipment Seed Processing & Handling Equipment	

		US$
(d)	Participant Training	209,390
	(1) IAR	
	Plant Breeder Plant Pathologist Agronomist In-Service Training	
	(2) EPID	
	Agronomy Extension Agricultural Engineering Agricultural Marketing Agronomy - Seed Production In-Country Specialized Training	
(e)	Other Costs	213,230
	(1) International Travel Expenses	
	(2) Revolving Fund	
	(3) Miscellaneous Office & Laboratory Supplies	
	(4) Seed Processing Building	
	(5) Administrative Assistant	
	(6) Contingency	
	Total	US$2,583,358

2. GOE - EPID and IAR financial inputs per project design for five year life of project.

		Birr Cost	US$ Equiv.
(a)	Personnel	1,115,713	
(b)	Buying Stations	75,000	
(c)	Office Equipment	32,620	
(d)	Materials & Supplies	364,600	
(e)	Services (Rentals & Utilities)	218,357	
(f)	Transport (Pool & Maintenance)	414,000	
(g)	Miscellaneous	52,500	
	Total	2,272,790	1,108,678

III. STATUS OF U.S. INPUTS

A. Technical Assistance

1. Pulse Production Agronomist

The technical expert was recruited to function as the team leader coordinating the work efforts of the U.S. funded expatriate technical assistance team. Responsibilities include working closely with the EPID providing the necessary emphasis on pulse production in the MPP extension effort and be involved in all extension activities relating to the pulse project. Training was to be conducted for extension personnel involved in pulse activities, as well as in-service training for Ethiopian pulse production specialists. Subject matter guidance was to be imparted to extension personnel by the pulse agronomist who was also to assist in the selection Ethiopian candidates for participation in the USAID supported training program.

The performance against plan has been satisfactory. However, training programs for extension personnel and production specialists have not been conducted due largely to personnel shortages. The pulse agronomist has conducted the majority of the activities above without the full time collaboration of an Ethiopian counterpart.

2. Marketing Specialist

The technician's responsibilities were to review in detail the possibilities of initiating a purchasing and marketing program for pulses, and establish the institutional framework within which such a program would be conducted. Additionally, the technician was to study domestic and export marketing patterns for pulses and participate in the evolution of overall policies for the marketing of agricultural produce in Ethiopia in close cooperation with EPID, EGC and other agencies. The technical expert was to assist in the development of a cooperative marketing program for EPID; liaise with the storage and processing specialist, the Ethiopian Standards Institute and with EGC and EGB staffs; and assist in the selection of Ethiopian employees for graduate training.

The performance against plan has been satisfactory. The marketing specialist in his analysis of the potential for a pulse marketing program noted that the five marketing stations which were to house additional seed equipment and serve as the base for the marketing component had not been established and that existing seed cleaning and processing equipment was more than adequate for present and estimated future requirements. A recommendation was entered and accepted not to proceed with a model pulse marketing program. The marketing specialist, in the absence of a marketing program was released from his host country employment contract on June 30, 1977.

3. Pulse Breeder Agronomist

The responsibilities and duties of the pulse breeder are to serve as a senior advisor to the national research efforts on pulses. With the assistance of other pulse research agronomists design an appropriate research program and determine which pulse crops and varieties should be tested, the breeding methods used and the main objectives of pulse breeding, whether for yield, quality, adaptability, disease resistance, etc. He is also to advise on making research results available for adoption in the extension component of the program, and ensure that research findings are documented and disseminated to extension personnel. He is to assist in providing in-service training with emphasis on plant breeding for Ethiopian agronomist liaise with international research institutions, collect and assemble germplasm of pulse species, and assist in the selection of candidates for the participant training program.

The performance against plan has been satisfactory. Although the functions have become more managerial than originally planned, duties have in general, conformed with the original scope of work. The plant breeder has assumed various responsibilities of station management during the establishment and construction of plant research and pathology facilities at the Melkassa Farm. These responsibilities have included decision making and supervision related to design and

construction of irrigation facilities, farm design and layout, and other building construction. Although provision of essential technical advisory services has been an important part of these responsibilities, much effort and time has been expended resolving problems and issues not directly related to plant breeding. In-service training with an emphasis on plant breeding has not been conducted due to a shortage of personnel with the necessary background.

4. Plant Pathologist

Pathologist responsibilities are to identify diseases affecting pulses in Ethiopia; screen and, if possible, develop varieties that are resistant to those diseases and participate in breeding of these varieties. He is also to participate in the development of cultural practices suitable for reducing the occurance of diseases and in the development of remedies against diseases; assist in providing in-service training with emphasis on pulse breeding and assist in the selection of Ethiopian candidates for the participant training program.

Performance against plan has been adversely affected due to recruitment delays. The pathologist did not arrive until early 1977, more than 2½ years after recruitment was initiated. However, since his arrival the pathology laboratory equipment procured under the project has been installed in the IAR research facility in Nazareth and is in operation.

5. Seed Storage and Processing Specialist

The responsibilities and duties are to assist in selecting seed cleaning and processing equipment for procurement under the project, be responsible for installation of the above equipment in the processing facility; assist in selecting and installing seed processing equipment in the EPID buying stations if necessary; train Ethiopian personnel in proper use and maintenance of processing facilities; develop and disseminate methods for improved handling and storage of pulses throughout the marketing channels; and assist in the selection of Ethiopian candidates for participant training.

Seed cleaning and processing equipment arrived in-country, and was inventoried by the technical specialist. In view of the decision not to continue plans for a pulse marketing component under this project the technician's involvement with additional processing equipment has become unnecessary. (See Item IV.C., Marketing).

Construction of the seed processing facility to accomodate the seed equipment purchased under the project was delayed due to budgetary and other financing problems. Unfortunately, the 24 month tour of the agricultural engineer ended before construction of the seed building could be completed. The technician declined an offer to extend for a three to four month period, and thus, will not participate in the installation of the seed processing equipment or training of Ethiopian personnel in its operation and maintenance.

6. Technical Assistance Administrative/Logistic Contract Problems

Technical assistance to the pulse project, as with most other recent USAID/Ethiopia supported development activities, has been provided in accordance with the operational expert (OPEX) concept. Technical expert under this system are contracted to, and thus are employees of, host government Ministries or implementing agencies. Technical personnel with host country contracts under the OPEX system must rely on the employing GOE agency for administrative and logistic support including customs clearance of personnel effects, securing resident visas and identification cards, and obtaining suitable housing.

However, since the inception of the OPEX system, changes have occured within Ethiopia which have decreased the capability of the employing GOE agencies to provide administrative and logistic support as provided in the project agreements and as noted above. USAID/Ethiopia has been informed, through official correspondence from the host government, as well as through informal consultation with Ministry officials, of this declining capability and that foreign donors and legations in Ethiopia enjoy more success in obtaining logistic support for their technical experts than does the employing GOE agency. Due to the existing contractual arrangements the U.S. Mission in Ethiopia has not been prepared to assist U.S. expatriate technicians either formally or informally.

Since neither regular administrative nor logistic support, such as noted above, has been forthcoming either from the host government or from the U.S. Mission, the individual technicians have attempted to handle these administrative matters for themselves and their families. They have not always been successful. In some cases family members have reluctantly elected to return to the U.S. because U.S. expatriate technicians have been unable, on their own, to locate adequate housing.

The difficulties encountered by U.S. pulse team expatriates in attempting to adapt to cumbersome, time consuming procedures in a foreign atmosphere have led to unusual hardships. In many cases technicial personnel spend weeks attending to the intricacies of customs clearance, securing identity cards, visas, conforming to the regulations for conversion of currency or obtaining travellers checks. These hardships notwithstanding, the time consumed in attending to processing of administrative matters is a factor of sufficient importance that it must be considered in evaluating contractor performance. Pulse team technicians estimate that the collective efforts expended in pursuit of personnel administrative and logistic matters have consumed 7 person months. Thus, approximately 10% of the team's tour, to date, has been devoted to support efforts at the expense of project activities.

It is clear that the contractual arrangements for provision of technical assistance must be carefully reviewed and modifications instituted effectively addressing the problems of administrative support.

7. Technical Assistance Cost Effectiveness

The impact of technical assistance and thus the cost effectiveness is adversely affected through outdated contractual provisions as noted above, involving administrative support. Other contractual provisions additionally tend to encourage inefficiency. The design of the OPEX system included provision for financing of the technical expertise in part by the employing agency. With financial interest vested therein, the employer is influenced to carefully examine the performance and the need to retain employees. It was assumed that by sharing in the cost, the employer would try to maximize the technician's contribution to the development effort, and would carefully weigh the advantages and disadvantages to the government of continued outlays of financial resources. All of the U.S. technical personnel recruited for the pulse project (and all but one of the other individuals recruited under the OPEX system for USAID sponsored projects in Ethiopia) have been fully funded by USAID. From the standpoint of economic use of budgetary resources there is little incentive of the part of the host government to insure cost effectiveness of USAID expatriate technicians.

One notable difficulty affecting contractor performance is the problem of transportation. Despite the contention of many Ethiopian Ministry personnel that expatriate technical expertise is a critical element to agricultural development, U.S. technical personnel hired at considerable cost for short durations, generally rank low, if at all, on transportation priority lists. Often transportation problems can be directly attributable to vehicle or petroleum shortages which are not easily rectified in a timely fashion. Nevertheless, whether the problems are the result of shortages, administrative difficulties, etc. unpredictable access to transport continues to reduce the effectiveness of pulse project technical personnel. The existance of transportation problems is not so important in relation to cost effectiveness as is the absence of sufficient concern to find and implement a solution. Regardless of the urgency of a given trip, when a constraint to transport exists the expatriate does not travel.

The fact is that U.S. technical personnel under the OPEX system are almost completely on their own. If they can function and generate some sort of achievement fine; if they cannot, it is unfortunate, however, nothing is really lost. As such there is little incentive to build in adjustments which might reduce constraints which hamper expatriates. Foreign technical personnel who are funded to expedite a project objective must be provided with personal administrative and project oriented support necessary to enable them to execute their terms of reference.

B. Commodities

Four PIO/C's (Nos. 40023, 40024, 40025, and 40026) were issued during the period October - December 1974 and all of the ordered commodities are on hand, with the exception of two agricultural trailers which were cancelled due to local availability. Substitutions of two line items have caused problems. A belt thresher substituted for the one ordered is not suitable for project needs. It should be returned or otherwise disposed of. Four of the calculators substituted for those ordered have been deadlined for several months due to absence of a repair capability. Repair manuals and schematics necessary to effect repairs have been ordered. Procurement agents should be instructed not to make substitutions without approval from USAID/Ethiopia and/or Host Government technical personnel.

Due to delays in the arrival of U.S. technical personnel and host government organizational reorientation, facilities intended to house a large proportion of the commodities were not constructed on time. Some of the commodities, most notably the seed processing equipment, are still in the original packing and have not been examined. Efforts have been made to store these cases and boxes in protected storage, however, some items are still in unprotected and less-than-adequate storage.

Spare parts received with the tractors and farm equipment appear to be adequate. There has been expressed dissatisfaction regarding the availability of Jeep vehicle spare parts. Procurement has been initiated and delivery is scheduled for early 1978.

C. Participants

See Sections IV.A.4., and IV.B.5.

D. Other Costs

For detailed breakdown see Financial Tables.

E. Financial Tables

1. USAID/Ethiopia Life of Project Funding

Original USAID funding for life of project was projected to be $2,583,000. AID/Washington budgetary limitations as well as the inability to utilize support funds in a timely fashion (i.e. lack of success with participant training program) have reduced life of project funding to $2,253,000.

Fiscal Year	Obligation
FY 1974	$ 619,500
FY 1976	180,000
FY 1977	468,900
FY 1978	200,000
FY 1979	400,000
FY 1980	273,000
Total	$2,192,000

2. USAID/Ethiopia Expenditures to Date

	FY-74	FY-75	FY-76	FY-77	Sub Total	FY-78
Technical Services	-0-	-0-	140,404	217,128	357,532	-0-
Production Agronomist Team Leader						
Plant Breeder						
Plant Pathologist						
Seed Processing Specialist						
Marketing Specialist						
Consultants	-0-	1,511	-0-	-0-	1,511	-0-
Participant Training	-0-	-0-	-0-	16,575	16,575	-0-
(LT) Habtu Assefa, Plant Pathology				10,200		10,200
(ST) Taye W/Semaite, Seed Technologist				6,375		
Commodities (000)	-0-	-0-	144,839	65,709	210,548 1/	-0-
4-wheel drive vehicles						
Bicycles						
Farm tractors - plows, disks						
Farm equipment						
Research lab. equipment						
Seed cleaning equipment						
Office machines						
Irrigation pumps-pipe						
Commodities Sub-Total			144,839	48,784		
Vehicle spare parts				16,925		

1/ $12,822.00 deobligated.

	FY-74	FY-75	FY-76	FY-77	Sub Total	FY-78
Other Costs	-0-	12,448	29,367	43,125	84,940	-0-
U.S. technician International Travel	-0-	-0-	1,497	6,461	7,958	-0-
Revolving Fund	-0-	12,448	22,963	-0-	35,411	-0-
GOE International Travel	-0-	-0-	4,160	4,169	8,329	-0-
Contractor Per Diem	-0-	-0-	747	2,016	2,763	-0-
Well Drilling	-0-	-0-	-0-	26,479	26,479	-0-
Invitational Travel	-0-	-0-	-0-	4,000	4,000	-0-
Total					671,106	
					+ 62,000 (Direct Hire)	
					733,106	

IV. PROGRESS TO DATE

A. Research - IAR

Prior to inception of the USAID sponsored Pulse Project the Institute of Agricultural Research (IAR) had conducted screening and breeding activities in various locations throughout Ethiopia to select varieties of pulses best suited to the principal zones of production. The pulse project research was intended to utilize and build upon the existing IAR research results. Research activities were to be directed toward development of high yielding, commercially acceptable varieties which are also adaptable in a wide range of the many Ethiopian micro-climates.

Pulse research activities of a significant nature had been in operation only a few years prior to 1974 and had been limited primarily to screening and testing varieties. In building upon this research program the Pulse Project intended to incorporate the services of a pulse breeder to design and guide the research program in developing better yielding varieties which would meet the requirements of domestic and international markets. In collaboration with the plant breeder a plant pathologist would be assigned to develop varieties resistant to the many diseases endemic in Ethiopia.

During the first five years of the project emphasis was to be placed on research with the expectation that high yielding disease resistant seeds will be developed and multiplied for distribution to farmers.

OUTPUT - 1

Establishment of Pulse Research Laboratory and Field Testing Unit. The output target includes development of research design, pulse laboratory in operation and field variety trials underway.

(a) Achievement to Date

Pulse Research Design Developed

In June 1974, recruitment was initiated for a pulse breeder agronomist who arrived in December 1975. The pulse breeder's terms of reference provided that he would serve as the senior advisor to the national research efforts on pulses, and with the assistance of other pulse research agronomists design an appropriate research program, determining which pulse crops and varieties should be tested, breeding methods used and the main objectives of the breeding program. Upon arrival of the USAID recruited pulse breeder, Mr. Lars Ohlander (FAO) had been in charge of the national pulse program serving as National Pulse Coordinator for IAR. Mr. Ohlander, in January 1977 just prior to his departure, suggested that Dr. Markarian assume national pulse coordination responsibilities. Dr. Markarian proposed that more appropriately he should collaborate in an advisory capacity with Ato Yohannes Negassa who would assume responsibility as the national coordinator.

In March 1976, Dr. Markarian in consultation with Mr. Ohlander and Ato Yohannes proposed a pulse breeding program for 1976-77 which identified the crops to be included in the program and the breeding/research methodology to be incorporated. The program included haricotbeans, chickpeas, lentils, horsebeans, and fieldpeas. An ancillary component of the national pulse research program is the annual review of field trials. Among the primary outputs of this review are determinations guiding the current season's field trials including decisions concerning which trials to continue, discontinue, or revise. Dr. Markarian in collaboration with Ato Yohannes, the National Pulse Research Coordinator and IAR and EPID staff has been instrumental in providing guidance and direction to annual field trial policy.

Pulse Research Laboratory

In the fourth quarter of 1974 orders were placed for laboratory equipment to complement existing facilities to accommodate specialized needs in plant breeding and pathology. Although receiving reports have not been completed the ordered commodities have arrived in country and have been installed in the Nazareth IAR research facility.

Recruitment for expatriate assistance in plant pathology was initiated, along with the other members of the expatriate pulse team, in June of 1974. Due to recruitment delays Dr. Moustafa, the Plant Pathologist, did not arrive in country until March 1977. Since that time, however, he has assisted in the installation of equipment, the establishment of the laboratory facility, and has initiated research activities to identify pulse pathogens and disease resistant varieties.

A head house, designed to accomodate both plant genetic and pathology research in pulses, is under construction and nearing completion at the Melkassa field research unit. The entire IAR research facility is scheduled to move from Nazareth to Melkassa in the near future. Upon completion of the head house, the laboratory equipment will be reinstalled there-in and pathology and breeding research will begin operations at Melkassa.

Although construction has not begun, funding has been allotted for two green houses and a screen house to be built for use in conjunction with the head house research facility. The original project design did not include designation of the exact location of the pulse project field research unit. The 200 ha. at Melkassa was approved for use as a research facility in early 1976. Despite the overall suitability of the area for research activities, the Melkassa farm lacks potable water necessary for conducting breeding and especially pathology research. In order to rectify this deficiency a proposal was entered and approved to incorporate, within the project, development of a potable water well at Melkassa.

Field Testing Unit

With approval to utilize 200 ha. at Melkassa for IAR research, activities commenced to develop the land and establish a program consistant with sound research principles. The topography of the area dictated the need to establish water control in conjunction with development of an irrigation system. Land surveying, canal and bund construction along farm contours, procurement of two irrigation pumps, pipe, etc. and construction of a permanent pump house were incorporated to expand the utility of the research unit as an additional project component.

Field Trials

Detailed reports describing methology, objectives, and results of field research activities at the Melkassa research unit (as well as other research sites) have been compiled by and are available through IAR. The majority of the Melkassa field research initiatives are performed in conjunction with identical trials conducted on a selective basis among one or more of the following sites: Awassa, Debre Zeit, Koka, Arba Minch, Humera (discontinued), Bako, Angar Gutin, Didessa, Jimma, WADU, ARDU, Kulumsa, Bekoji (see Annex 2 for locations of pulse trials in Ethiopia). The following is a summary of pulse field research activities which are being conducted at Melkassa and other locations:

		Number of Sites At Which Research Trial is Being Conducted
1.	Haricotbean National Yield Trials	16 sites
2.	Haricotbean Variety Trial	3 "
3.	Haricotbean Nursery 'A'	1 "
4.	Haricotbean Nursery 'B'	1 "
5.	Haricotbean Fertilizer Trial	1 "
6.	Phosphates Residual Effect Trial	1 "
7.	Mungbean National Yield Trial	7 "
8.	Sixth International Mungbean Nursery	2 "
9.	Mungbean Sowing Date Trial	1 "
10.	Adzukibean Variety Trial	3 "
11.	Limabean National Yield Trial	5 "
12.	IITA Limabean Uniform Cultivar Trial	1 "
13.	Pigeon Pea Evaluation of New Introduction .	3 "
14.	IITA Cowpea Uniform Cultivar Trial No. 1 . .	2 "
15.	IITA Cowpea Uniform Cultivar Trial No. 2 . .	2 "
16.	Cowpea National Yield Trial	5 "
17.	Cowpea Breeding, Selections in Segregating Populations	1 "
18.	Cowpea Plant Population Trial	1 "
19.	Hyacinth Bean Variety Trial	3 "
20.	Grass (Rough) Pea Nursery	1 "

(b) Achievement to Date Compared with Original Plan

The original project design does not include specific methodology describing how the output will be achieved nor a detailed statement of the final composition or functions of the output. Nevertheless, using the somewhat general terminology available as guidance, the achievement to date conforms very closely to the original output statement. A research laboratory is staffed and equipped at Nazareth and a new facility is under construction to accomodate both pathology and breeding research. An irrigated field testing unit is operational with variety trials underway.

(c) Linkages to Other Activities

As noted in 2.b. below, field research activities are being conducted in conjunction with other IAR and National University research sites throughout Ethiopia.

(d) Problems

Many significant problems related to acquisition of land for the field research unit have been overcome. Other problems serving as constraints to output achievement have been: delays in recruitment of expatriate staff; shortage of gasoline, unavailability of building materials, insufficient EPID and IAR budgets for construction of seed processing building and potable water well; and insufficient petty cash for daily operations.

OUTPUT - 2

Development of Higher Yielding, Better Adapted Pulse Varieties

(a) Achievement to Date

Virtually all of the data developed to date leading to the release of improved pulse varieties has been generated independently and prior to the inception of USAID support to pulse development. CADU, now ARDU has been engaged in highland pulse research involving chickpeas, lentils, fieldpeas, horsebeans since 1967. The CADU facility was responsible for the coordination of the Ethiopian Lentil Research Program prior to assumption of those activities by the Debre Zeit Research Station, and until 1975 CADU also coordinated the National Soybean Research Program, A major contribution to the development of higher yielding, better adapted pulse varieties was made by Mr. Lars Ohlander during his five years of research extending through early 1977.

The development of higher yielding better adapted pulse varieties is accomplished by screening for superior introductions, through selection from segregating populations or by adjusting the genetic makeup of the plant material either by hand or natural crosses. Variety development methods involve: (a) disease screening trials to identify plant types which escape local diseases; (b) time-of-planting trial to identify the most suitable dates for planting various varieties; (c) national yield trial to determine the best performers in a group of varieties that must be narrowed down to one or two. The above methodology in varying degrees of application are being incorporated within the pulse research program in the development of improved pulse varieties. Although such research is largely an on-going and continuous process, development of superior varieties generally requires a minimum of five years. The present stage of pulse research varies according to the variety. The haricotbean national yield trial was terminated last year and the recommended varieties are listed. Some varieties have another year of trials to go, while others will require a longer period before research is completed and variety releases are identified. A pulse research paper published in March 1977 summarizes the stage of development of improved haricotbeans, horsebeans, fieldpeas, mungbeans, adzukibeans, lima beans, pigeonpeas, cowpeas (see Annex 3). The research findings stated therein appear to reflect the combined data of University, Ministry of Agriculture and Settlement, and Institute of Agricultural Research (IAR) sponsored pulse research. Chickpea and lentil research currently being conducted under the aegis of the National University through the Debre Zeit Research Station is scheduled to generate higher yielding varieties within three to five years. This research is under the supervision of a USAID sponsored PhD plant breeder seconded to the Debre Zeit Station and is being conducted in collaboration with similar and complementary research at ICARDA (Syria), the Institute of Agricultural Research India (IARI), and ICRISAT (India).

As noted above progress toward the development of improved pulse varieties is the result of coordinated effort by all Ethiopian pulse research facilities and their branch field stations. The role of USAID support to this effort is relatively recent and has not involved a major contribution to development of higher yielding better adapted pulse varieties. Nevertheless, the USAID pulse project has provided senior technical advisory services at the National Pulse Coordination Center at Nazareth (assuming the technical responsibilities of the departed Mr. Ohlander) to assist in the continued coordination and further development of pulse varieties.

(b) Achievement to Date Compared with Original Plan

As specified in the Pulse Project Design, IAR would undertake and coordinate the research component of the project in close collaboration with University, Ministry, other Ethiopian research agencies and international research facilities. IAR had been conducting a screening and breeding program to select various varieties of pulses best suited to the principal zones of production. A pulse breeder was incorporated into the project design to provide advisory services in designing and guiding a program in developing better yielding varieties meeting requirements of domestic and international markets. A pulse pathologist was programmed to develop varieties resistant to the many diseases endemic in Ethiopia. The research component was to utilize and build upon existing IAR research results.

The project design, as stated did not provide that the USAID supported research activities would generate higher yielding better adapted varieties independently of on-going research activities but rather that USAID inputs and technical services would augment the IAR program. Support to the research program has been provided in accordance with the original design with the exception of the lengthy time period for arrival of technical personnel in general and the pathologist in particular.

OUTPUT - 3

Recommendations for Improved Cultural Practices Developed for Each Pulse Variety for Transmission to EPID for Multiplication and Production

(a) Achievement to Date

At present the most recent recommendations for improved cultural practices used by extension agents was published in February 1974. The pulse project has made no significant progress in processing the results of research findings in a form suitable for extension.

(b) Problems to Obtain Higher Yields

Despite the existance of an abundance of pulse research being conducted in a variety of locations throughout Ethiopia the provision of new technologies and improved practices to small scale farmers is not extensive. Research results generated by IAR and other institutions must be published in a timely fashion and distributed to the extension service, i.e. EPID, which in turn makes the knowledge and practices available to farmers. The above procedure has not functioned well in recent years, which is due largely to an overall shortage of trained staff. Publication of research results has been delayed due to the substantial workload of senior research scientists who must devote

a significant proportion of their time to running of routine activities and coping with a plethora of administrative problems; report preparation thus, tends to become postponed. Additionally, the IAR publication section has been understaffed and substantial delays in submission of reports from the field has compounded the problem. Finally, understaffing in the extension service has impeded preparation of research information in a form which extension agents could utilize effectively.

OUTPUT - 4

Trained Resident Staff

The output target is composed of three 2-year post graduate training programs plus on-the-job training. The traditional participant academic training component was intended to prepare Ethiopian staff of the implementing agencies to replace senior expatriate personnel in plant breeding, plant pathology, and production agronomy and to provide additional depth in management and administration.

(a) Achievement to Date

In October 1976, Ato Habtu Assefa departed Ethiopia to begin a three year program at the University of Florida leading to a MSc. in Plant Pathology. Although candidates for the other participant positions were identified and approved they were unable to depart country due to inability to secure exit visas. In view of the difficulties experienced in securing exit visas for MSc. degree training candidates, short-term courses were programmed in order to partially achieve training objectives. In May 1977 Taye Woldesemait departed to attend a three month Seed Technology Course at Mississippi State University.

(b) The Effect of Changes in the Training Program

The inability to conduct a successful training program has seriously undermined the possibilities of achieving project objectives. It is guaranteed that the project objectives will, at best be considerably delayed. In order to conduct an in-depth research program with the required dynamics and technical knowledge to perpetuate the many diverse aspects of research activities personnel trained in the above diciplines are requisite. In point of fact the timing of the training program and coordination with the technical services component has been a complete failure: The training program was to complement the technical services component by generating trained personnel to replace expatriate technicians and carry forth a continuous and growing research program. The production agronomist completed a 24 month tour and departed Ethiopia before an Ethiopian replacement could commence training. The Plant Breeder will complete a 24 month tour in December 1977 under identical circumstances. The Ethiopian participant currently in training is scheduled to complete requirements for MSc. degree in plant pathology eight months after the incumbent expatriate pathologist has completed his initial 24 month tour.

The underlying principle for the provision of expatriate technical assistance (whether fully-funded or salary supplemented by USAID) is that USAID will more rapidly achieve its joint project objectives with the GOE by assisting Ethiopian agencies or institutions to maintain or improve the efficiency of their operations while a cadre of qualified Ethiopian employees is developed to assume the respective responsibilities of expatriate technical personnel. Unfortunately, advantages accruing from the provision of U.S. technicians to the pulse project will be, at best, short lived in the absence of replacement Ethiopian officers.

B. EPID[1/]

OUTPUT - 1

Extension of Improved Technology and provision of appropriate pulse production inputs to 12,000 small scale farmers.

(a) Achievement to Date

In October 1975, the pulse team consisting Dr. Mason E. Marvel, Agronomist, Team Leader; Mr. Jean Gatzmayer, Agricultural Engineer; and Mr. Charles Peters, Marketing Specialist; arrived in Ethiopia. The research team arrived in subsequent months.

Upon arrival the team began studying documents related to pulse production in Ethiopia and took several orientation trips to centers to become familiar with the pulse production areas and get to know EPID agents and other concerned workers.

They developed liaison with pulse research and production centres inside the country and abroad. Both the expatriate and the Ethiopian counterparts visited the major International Agriculture Research centres that work with the pulse crops where they collected information and publications. An early effort was made to collect, study and evaluate all publications available on production and marketing.

A series of field visits were made to most areas of the country to observe both production research and demonstration fields. Three collection and selection trips were made to three different areas of the country to select and collect horsebeans, single plant seed samples with desirable characters. Several hundred single plant seed samples were collected, described and catalogued as to location.

At a later date during the initial project tour the team made an effort to redirect the project to concentrate on crops where the greatest domestic need appears.

1/ Outputs 1 through 4 description of achievement drafted by EPID staff.

(b) Achievements as Compared with the Original Plan

From the documents the evaluating team has gathered, the pulse group as a whole concentrated on information gathering and dispatching various cultural practices. The actual implementation according to the program was not completely fulfilled.

OUTPUT - 2 - Effective farmer utilization of EPID extension system.

In accordance with IAR, EPID has been disseminating available research results and has established several demonstration fields throughout the major pulse growing areas. Based on these extension activities recommendations on chickpeas, haricotbeans, horsebeans, lentils were published in the Extension Agents Handbook in 1974. In this handbook the major subjects covered are:

i. Condition of growth:

Optimum altitude
Optimum rainfall
Soil type

ii. Recommended varieties

iii. Cultural practices:

Land preparation
Planting methods
Sowing date
Plant population
Recommended fertilizers
Weeding

iv. Diseases and their controls

v. Pests and methods of control

These activities have been and are being conducted by EPID. The establishment of the USAID pulse project has strengthened and reinforced the existing activities and centralized the pulse program.

Achievement to Date

The research component of the project has not developed new agricultural techniques other than the previous ones developed before the inception of the project. Due to this constraint not much has been achieved in reaching the farmers with pulse extension.

OUTPUT - 3

Seed Multiplied

(a) Achievement to Date

Efforts have been made to get improved seed from different agencies. The only improved seed available at the time was haricotbean, 941 quintals have been obtained from a commercial farm. But due to the low international market price prevailing at that time, the demand for improved seed by the farmers for this particular crop was almost nil.

(b) Achievements as Compared with the Original Plan

There was no quantified target in the original plan, nevertheless, improved seed varieties are currently not being multiplied.

OUTPUT - 4 - Seed and other package inputs distributed to participating farmers.

(a) Achievement to Date

No improved seed has been provided by EPID to the farmers due to the unavailability of improved seeds from research organizations. The additional inputs (mainly experts) has reinforced the existing pulse crop unit (to a limited extent) in EPID assisting in provision of previously available cultural practices systematically to the farmers.

(b) Achievements as Compared with the Original Plan

The previously existing cultural practices have been brought to the targeted farm population. No other new inputs have been provided.

OUTPUT - 5

Trained Staff

The EPID portion of the participant training component was designed to fund four MSc. level programs: (1) Agronomy/Extension, to include substantial management training; (2) Agricultural Marketing, emphasizing pulses; (3) Agricultural Engineering, emphasizing Seed Handling/Processing; and (4) Agronomy, specializing in Seed Production, Certification and Technology. Additionally, in-country courses in Seed Multiplication/Processing was to be conducted as on-the-job training. Mississippi State University which specializes in Seed Production/Processing was to be recruited to prepare and present in Ethiopia a series of one week intensive training courses. The academic training in particular, was designed to prepare Ethiopian staff of EPID to replace the senior expatriate staff in the technical areas identified and to provide additional skills in management and administration.

(a) Achievement to Date

None of the candidates selected for academic training have been issued exit visas. Delays in construction of the seed processing facility resulted in the need to delay recruitment of Mississippi State University and the in-country training courses.

(b) Effect of Changes in the Training Program

The provision of expatriate technical expertise is intended to temporarily compensate for the absence or the unavailability of that particular technical skill within the host country. Under optimum conditions the expatriate will provide the expertise to generate an assigned level of output necessary to achieve the development objective within a specified time frame. The participant training program is designed to function in coordination with the provision of outside technical services by training host country personnel in the skill of the expatriate technician. The training is intended to develop the skills of host country personnel sufficiently to enable him to continue the same level of output after the departure of the expatriate.

As in the IAR training component, the inability to carry-out training objectives has seriously undermined project strategy intended to promote a viable pulse development program which would be self perpetuating at a significant level of output. Rather than providing critical expatriate technical expertise leading to the expansion of improved pulse production, technical expertise provided under the pulse project will serve as little more than a temporary expedient. The expatriate agricultural engineer and the production agronomist both completed initial 24 month tours of duty and returned to the U.S. before an Ethiopian intended to replace him could secure exit documentation and commence training.

Under such circumstances the benefits of providing technical personnel are short lived at best. Given shortages in personnel especially with esoteric technical training and experience, the work carried out after the expatriate's departure is often continued at a reduced rate of progress and frequently abandoned entirely. If it is desirable to achieve a particular goal, then provision should be incorporated within the project to guarantee formation of a structure with sufficient depth to generate progress until that goal is achieved.

C. Marketing

1. Outputs

An established Pulse Marketing System; a marketing plan design, and pilot marketing system established; staff trained.

(a) Background

Due largely to the existance of a UNDP program for re-construction and strengthening of the grain marketing system throughout Ethiopia there were, at the time of pulse project design, misgivings on the part of USAID regarding the establishment of a pulse marketing component within the pulse project. Nevertheless, with the intent of incorporating the USAID pulse marketing inputs within the future IBRD/IDA funded grain marketing institution (when it becomes functional), it was determined that the marketing component of the pulse project would be retained. USAID's support would initially be limited to the provision of an expatriate marketing advisor. The advisor assigned to EPID was to assess the feasibility of initiating a purchasing/marketing program for pulses, establish a framework within which such a program would be conducted, study domestic and export marketing patterns for pulses, participate in the evaluation of overall policies for the marketing of agricultural produce in Ethiopia, and assist in the development of a cooperative marketing program for EPID. Five purchasing stations, financed by the GOE, were incorporated in the program for construction in the lower Rift Valley and the Nazareth Area. USAID financing of the seed cleaning and processing equipment to be purchased for the buying stations was contingent upon review of the marketing advisor's equipment and marketing recommendations and GOE identification/establishment of the institution with authority and capability to administer marketing functions.

(b) Current Status

By the time the marketing specialist arrived in Ethiopia, in October 1975, establishment of the Agricultural Marketing Corporation (AMC) had been initiated. As illustrated in his report of April 1977, the marketing specialist shortly after his arrival (and the expatriate team leader) came to the conclusion that there would be few responsibilities to be performed in the field of marketing within the EPID structure which related to the pulse project. This was due primarily to the fact that EPID, given the establishment of the AMC, did not have a significant role to play in pulse marketing and had been in the process of extricating itself from active involvement in both input and output marketing. The marketing specialist assumed the responsibilities of the short term consultants in agricultural economics and marketing potential (who had been programmed in the initial design) through preparation (with Dr. Hash) of the pulse situation paper dated February 1976, and conducting pulse market surveys in Europe and the Far East. His other activities involved collaboration with the Ethiopian Grain Board (EGB) in planning and conducting the survey of cleaning and processing facilities in-country.

Although by the end of 1976 the five buying stations had not been established the requirement remained for an evaluation of additional requirements for seed processing/cleaning equipment within Ethiopia. This evaluation was to serve as the foundation for determining whether to proceed with commodity procurement and ultimately the marketing segment of the project. The results of the survey published January 12, 1977 stated that the 75/80 seed cleaning/processing plants already in place were more than adequate to accommodate existing and future projected requirements. In the absence of an operational marketing structure composed of pulse buying stations and given the existance of an adequate cleaning/processing capability within Ethiopia there appeared to be insufficient justification for launching a marketing program or purchasing additional equipment under the pulse project as provisionally included in the original design. USAID recommended that plans to establish a marketing component under the pulse project be discontinued and that the marketing specialist be released from his host country contract. The recommendation accepted by EPID, officially terminated the marketing portion of the program.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Highland vs. Lowland Pulse Crops

The pulse project was conceived during a period of high world market prices for haricot beans and although the final design as it emerged in 1974 did not reflect this priority the initial project activities favored production of haricot beans for export. With the proclamation of land reform and the adoption of socialism the emphasis on export earnings gave way to the higher priority of improving the quality and productivity of pulse crops traditionally consumed by the farming as well as urban population. Much of the USAID support to pulse development has been oriented toward the lowland varieties such as haricot beans rather than the highland varieties which include most of the pulse crops traditionally grown and consumed in Ethiopia. The field testing unit under development in Nazareth is located in an area unsuitable in terms of elevation and climate for most of the highland pulses. Much of the laboratory and all of the seed processing equipment is destined for installation at the Nazareth testing station, and the two remaining U.S. technicians funded under the pulse activity are assigned there.

Recommendation No. 1

Given the GOE objective of increasing food production for domestic consumption and the USAID development priorities of providing assistance as directly as possible to the poorer segments of the population it is the recommendation of the evaluation team that an increased proportion of USAID support be directed to the development of highland pulse varieties.

B. Extension

Substantial changes in the structure of government agencies, personnel changes, adjustments in priorities noted above, have had a predictable effect in shifting attitudes concerning development. The pulse project has not been insulated from the effects of these changing approaches. Moreover, World Bank support for the second phase of the Minimum Package Program (MPP) originally intended for mid-1975 is still experiencing delays which has resulted in budgetary problems for the extension service. As a result of these budgetary constraints EPID has been unable to develop and expand extension services as intended and described in the MPP II design. The interruption in budgetary support not only postponed plans for expansion of the extension program but also restricted the availability of funds for operation and recurrent expenditures. Substantial time and energy of limited EPID staff resources has been required to redesign the MPP II in order to secure Council of Ministers approval and ultimately budgetary support from various donors. These developments have not promoted the achievement of pulse project outputs originally programmed through EPID.

As noted in Section IV.A.3. above, the results of pulse research activities have not been made available in a form which is conducive for extension to small scale farmers. The current constraints within the extension service and the absence of published documentation describing improved pulse technology and cultural practices explain the circumstances surrounding the failure to provide improved technology and production inputs to small scale farmers as descibed in output No. 1.

Recommendation No. 2

Emphasis on extension of improved pulse technologies and inputs on a large scale throughout the Minimum Package net work is premature and should be deferred until improved practices and seeds are available in quantity and in a form designed for effective extension. Continued pulse project support to the EPID Pulse Unit should be designed to strengthen specific pulse extension activities in a limited number of selected highland and lowland areas. An effective liaison with IAR should be built into the EPID Pulse Unit, as a prerequisite in order to take full advantage of IAR research achievements and incorporate them into concentrated extension efforts to be conducted in the locations selected. If this recommendation is approved, a description of extension activities, locations, and details describing type and extend of support will be included in the project paper amendment.

Output No. 2, "effective farmer utilization of EPID extension system". USAID support to pulse development may indirectly serve to augment the capability of the extension service and contribute to the development of improved cultural practices for incorporation into the extension program, however, there is nothing within the project design which will insure effective farmer utilization.

Recommendation No. 3

The evaluation team feels that this output is misplaced in a pulse development program, would be more appropriate as a target in the MPP Phase II, and recommends that it be deleted.

C. Seed Multiplication

Output No. 3 and 4, "Seed Multiplied" and "Seed and Other Package Inputs Distributed to Participating Farmers". The opportunities for production of certified seed were significantly reduced with the break-up of large commercial farms in early 1975. Following the implementation of land reform, the abolishment of large commercial farms also eliminated the primary source of pulse export production, and also at least temporarily did away with one of the more promising resources for large scale production of certified seed. The increasing momentum of the revolution, combined with the institutionalization of land reform served to insure that the prerequisities for the establishment of an effective seed program, through which sufficient quantities of certified pulse seed might be generated would of necessity assume a lower priority. Time would be required to replace the large commercial farming enterprises with an effective state farm or other alternative system, and likewise, time would be required for the complete administrative transformation occuring throughout rural Ethiopia.

In effect the seed multiplication component of the pulse project was left with a revolving fund for purchase of certified seed. However, the infrastructure required both administratively and technically to establish standards and provide supervision for producing, grading, and certifing large volume of improved seed did not exist. Without seed the extension service was placed in a similar scenario such as that described under output No. 1 above: the extension system suffered from budgetary limitations while in this case multiplied pulse seed was not distributed due to unavailability.

Recommendation No. 4

Insufficient infrastructure exists at present to conduct, through the pulse project, an effective seed multiplication program which offers the probability of success. An Ethiopian National Seed Council is in the process of supervising the development of a program intended to accomodate national seed priorities. It is recommended that pulse seed multiplication be incorporated into the national program, and eliminated from the pulse project design.

D. Research

As noted in the original project design, it was anticipated that during the first five years of the project emphasis would be placed on research. Other components of pulse development incorporated into the project (extension, seed multiplication, and marketing) are to varying degree dependant on the results of research activities. As superior pulse varieties and more efficient cultural practices are developed and identified, multiplication, extension, and marketing become increasingly important as the vehicles for expansion of agricultural production and the generation of additional revenue. However, in the absence of improved materials and methodologies these activities can be expected to result in proportionally declining benefits.

Recommendation No. 5

In recognition of the relative success of pulse research activities as noted in Section IV.A. above and the continuing need to develop disease resistant and higher quality pulse crops the evaluation team recommends that continued support be provided to pulse research. In accordance with the proposal in V.A. above, support should provide increased emphasis to research on highland pulse varieties. Details describing composition of further support to pulse research will be include in the project paper amendment.

E. Marketing

As noted in Section IV.C., the marketing component has by mutual consent been deleted from the project.

F. Participant Training Program

Participant training under the pulse project has been a failure both in comparison with the original training objective and in limiting the effectiveness of technical services. Technical personnel provided through the project have temporarily filled a gap, but without trained Ethiopian staff replacements the project contributed virtually nothing to achieving long or medium range development objectives.

Recommendation No. 6

USAID and Ministry of Agriculture should jointly examine the need, vis-a-vis pulse development, for future training of Ethiopian personnel. Emphasis should be placed on determining which disciplines are most critical, the appropriateness of long vs. short term training, the extent to which the training program contributes to GOE pulse development goals, and the actions which will help insure achievement of training program objectives.

G. Technical Services

Although the technical personnel provided under the project performed satisfactorily in accordance with their scopes of work, significant progress toward long range objectives was not achieved. Delays in recruitment, inadequate support, disrupted construction schedules, absence of counterpart personnel, and failure of the training program combined to limit achievement within the technical services component.

Recommendation No. 7

In addition to examining the need for participant training, USAID and the Ministry of Agriculture should also assess the role of expatriate technical personnel in achieving GOE pulse development objectives, and the benefits of coordinating the provision of technical personnel and participant training programs.

H. Project Management/Administration

Pursuant to the original project design overall coordination and responsibility for the execution of the pulse project has been delegated to EPID with implementation to be carried out via the MPP. For reasons noted above the evaluation team has recommended that seed multiplication, as a component of the pulse project, be deleted. If recommendation No. 2 is approved directing support, within the EPID Pulse Unit to specific extension objectives in selected locations, and with discontinuation of the pulse marketing component the primary project emphasis will become

focused on research. Such focus should be oriented to applied research; specifically expanding pulse research activities, strengthening linkages between research and extension with the objective of demonstrating (initially within a limited area) benefits accruing to small scale farmers of applying improved technology in conjunction with superior crop varieties.

Recommendation No. 8

In view of the recommendation to continue primary project emphasis on pulse research, and the deletion/subordination of the other project components it is recommended that the Institute of Agricultural Research (IAR) assume responsibilities for future project implementation/ coordination.

Quantity of Pulses Exported from Ethiopia, 1965 - 1975
(in 1,000 Metric Tons)

Year	Chick Peas	Horse Beans	Haricot Beans	Lentils	Field Peas	Total
1965	9.5	17.8	19.7	5.8	2.3	55.1
1966	10.9	22.4	19.5	14.9	1.5	69.2
1967	10.7	24.7	17.9	15.0	0.9	69.2
1968	13.9	18.5	19.3	22.0	1.0	74.7
1969	8.0	27.4	16.7	24.5	2.0	78.6
1970	2.2	15.6	17.1	15.8	0.4	51.5
1971	6.3	16.6	22.6	18.0	0.2	63.7
1972	10.7	19.0	25.7	21.9	0.5	77.8
1973	8.1	29.7	79.1	22.1	2.4	141.5
1974	8.2	26.0	46.0	30.0	10.5	120.7
1975 (prelim.)	1.0	22.2	41.5	37.3	-	102.0

Source: The Ethiopian Pulse Industry; A Situation Paper, February 1976, EPID Publication No. 32.

Locations of Pulse Trials in Ethiopia

The locations where pulse trial work is (normally) carried out are followed by approximately altitudes in metres above sea level in brackets after the station/location name.

The following pulse species - chickpea, horsebean, fieldpea, and lentil - are generally considered "highland pulses".

A. Institute of Agricultural Research (IAR)

1.	Nazareth (1,600)	- Lowland pulses
2.	Bako (1,650) -	- Mainly lowland pulses, especially haricotbeans.
3.	Bako Sub-stations:	
	Didessa (1,300)	- Lowland pulses
	Holetta (2,400)	- Highland pulses, mainly horsebean and fieldpea
	Holetta Sub-stations:	
	Sheno (2,500)	- Highland pulses
4.	Jimma (1,750)	- Mainly lowland pulses such as soyabean, limabean, haricotbean
	Jimma Sub-stations:	
	Gojeb Valley (1,250) and others	- Lowland pulses
5.	Melka Werer (750)	- Irrigated lowland pulses (haricotbean, cowpea, mungbean)
6.	Gode (350)	- Irrigated lowland pulses (cowpea, mungbean)
7.	Mekele (2,000)	- Highland and lowland pulses (haricotbean, lentil, chickpea)
	Mekele sub-station:	
	Kobo (1,470)	- Lowland pulses, especially cowpea, mungbean, pigeonpea, hyacinth bean.

B. IAR/EPID Sites

1. Jijiga (1,900) - Haricotbean, mungbean, cowpea tried among others. Nights dry and cold.

2. Endibir (1,900) - Lowland and highland pulses

3. Chencha (2,800) - Highland pulses; results very poor so far

4. Nedjo (1,900) - Highland/lowland pulses; haricotbean on valley soil has been promising

5. Gambella (550) - Lowland pulses

C. College of Agriculture, Addis Ababa University

1. Alemaya (2,000) - Haricotbeans

2. Debre Zeit Experiment Station (1,860) - Lowland/highland pulses, especially chickpea and haricotbean

D. Extension Projects and Others

1. CADU (now ARDU) (1,500-2,800) - Lowland and highland pulses at various places in Chilalo Awraja

Main stations: Kulumsa (2,130)
Assassa (2,300)
Deneba (1,700)
Bekoji (2,700)

2. WADU - Lowland and highland pulses

Main trial locations:
Abela (1,400)
Bele (1,350)
Kokate (2,100)

3. Awassa Research Station (and SORADEP)

Awassa main station (1,700)	- Haricotbean, adzuki bean, soyabean
SORADEP Trial Fields - Among others: Alem Gebeya (1,900) Arussi Negele (1,680)	

4.	Arba Minch Farm (1,400)	- Various lowland pulses
5.	Angar Gutin Settlement (1,400)	- Haricotbean, soyabean, adzuki bean and lima bean
6.	Ambo Agricultural Institute (2,050)	- Haricotbean, horsebean, fieldpea, chickpea (Not functioning at present)
7.	HADP - Setit Humera (500)	- Mungbean, cowpea, pigeon pea. (Not functioning at present)
8.	EPID	- 16 one-hectare sites in cooperation with IAR for variety testing. No pulse testing as yet.
		- Various other EPID sites have been used occasionally.
		- Occasional trials/observations at various other places.

Improved Pulses Ready for Release

I. Haricotbeans

A. White Pea Bean for the Export Market

1. Mexican 142

2. Ethiopia 10

3. Tengery 16

All three are high yielding (no statistically significant differences in yield levels in trials) and with a fair disease resistance. All three equally good from the farmers point of view. Mexican 142 is, however, the best known on the European market.

B. Coloured Beans for Local Consumption

Black Dessie

Negro Mecentrau

Both are black seeded and have a high level of disease resistance and are consistently among the highest yielders. Black Dessie, which is a semi-trailing type, has been the overall highest yielder in haricotbean NYT 1974-76. This variety can be recommended wherever haricotbeans can be grown.

Negro Mecentrau is a bush type and seems to be somewhat more demanding of fertility and general care than Black Dessie so that it is the highest, or among the highest, yielders where general yield levels are high. Yields tend to drop back compared with Black Dessie when conditions are less unfavorable.

As both are black they cannot be exported to the traditional export market for Ethiopian haricotbeans. On the other hand the USA seems to export a fair amount of black beans to South America.

Brown Speckled

A large brown speckled kidney bean - this variety is not as high yielding as the varieties mentioned above and is not as disease resistant. However, it seems to be preferred on the local market. It probably has limited export potential; may or may not be worth releasing.

C. Other Haricotbeans

There is a demand on the export market for white haricotbeans of the small or large flat type and large white kidney beans. The larger types normally command premium prices. No high yielding lima of small flat, large flat or large kidney are currently available.

One selection of the medium size flat type which has done reasonably well in trials is Nazareth Selection 165 which could be considered if a price premium over Mexican 142 can be obtained. Yield levels are likely to be about 70% of the Mexican 142.

Two other Nazareth Selections - Naz. Sel. 203 and Naz. Sel. 199 have done well under adversely dry conditions, e.g., Mekelle and Konso and given overall yields of 85-90% of those of Black Dessie. They are large, round and white and seem to have a limited appeal on the export market but might generate some interest. Naz. Sel. 199 has been released in Konso by the EPID/ECNY project working there and is gaining popularity with the farmers.

II. Horsebean

4-5 relatively high yielding varieties have been developed. They have given good and stable yield over a number of locations even if they normally do not show much advance over a well chosen local check plot. If farmers wish to buy horsebean seed, however, the following would be suitable to distribute:

1. 20 - D ex-Kulumsa
2. 38 - B ex-Kulumsa
3. 11 - A ex-Kulumsa
4. Italian Faba ex-Debre Zeit
5. KUSE 2-27-33

There does not seem to be any significant differences in disease resistance between the five lines which are all of Ethiopian origin (with the possible exception of Italian Fab ex-Debre Zeit which also may be of Ethiopian origin). This means that they are suceptable to chocolate spot and at lower altitudes, rust.

20 D ex-Kulumsa is a large seeded type (broadbean type) and seems to be popular among local consumers.

The Middle East market apparently prefers the oval shape medium size ones, which the other four lines more or less approximate.

If only two are chosen they should be: 20 D ex-Kulumsa and KUSE 2-27-33.

III. Fieldpea

Probably nothing available. However, one European Type Variety Pression Blue has done well in the National Field Trials but it requires proper weed control to yield good results and peas rarely get that in Ethiopia. Two other varieties could be considered because of their large round white to yellow seeds: Fieldpea ex-Debre Zeit and Mohandarfer. These are more like the normally grown Ethiopian types in growth habit and will do equally good/bad as local lines with no weed control.

IV. Mung Bean

Considering yield potential and disease resistance only the following lines should be considered:

		Origin
1.	N 76	Oklahoma State University
2.	N 109	Peru
3.	N 409	Peru
4.	N 1134	Oklahoma State University
5.	N 76	is early maturing, the others late maturing
6.	For Melka Werer area N 409 and N 1134	
7.	For Kobbo N 109, N 409, and N 1134 are recommended but N 1134 is preferred especially if rains are early	

For other areas possible N 1134. If growing can be taken up again at Setit-Humera the variety ex-Gode should be used in spite of lower disease resistance as on trial evidence it is superior there. Care should be taken that seed used is free from bacterial blights. N 1134 has not been tried at Humera but could possibly replace ex-Gode if trials prove it to be equally good or superior there (which is likely).

It should be mentioned here that mung bean (in this case N 109) has been tried by the Supplementary Food Project (formerly run by ENI) to substitute the 10% of peas which is normally used in Faffa. The final product was good with no test difference from the ordinary product. As the protein content is a little higher and mung beans contain much less flatulence factor than peas it would be advantageous to use mung beans instead of field peas or chickpeas. This could create an initial small market for mung bean. Mung beans seem to be acceptable to the Ethiopian consumer; they taste like lentils and do not require much boiling.

V. Adzuki Bean

On existing evidence any of the following lines are superior to ex-Ministry of Agriculture:

AVRDC Account No. - 5028
5037
5067
5068
5070
5073
5074
5081
5082
5083
5098

There are no significant yield differences among trials. Good to very good results have been obtained at Nazareth, Anger Gutin, Awassa and Nazareth. It has been released for local consumption at Angar Gutin (already given to farmers) and in the Bako area. In the Rift Valley introduction might be possible only if export to Japan is possible at a good price, i.e. something like 50 Birr/quintal farm gate.

For export a variety with dark red seed colour should be selected. If only two lines should be chosen preference should be given to 5037 and 5067.

VI. Lima Bean

A. Pole Types

1. Calico Pole
2. Carolina Sieva Pole
3. California Baby Lima

B. Bush Type

Calico Bush

VII. Pigeon Pea

1. Short Duration

DR - 5

For Kobbo when it is further developed (1-3 years): Kobbo Composite.

2. Long Duration

Ex-Florida

VIII. Hyacinth Bean

1. A - 51268

2. Vietnam, Saigon Market II

IX. Cowpea

Indications so far indicate that it will partly be difference varieties in different areas. When all results for 1976 are summarized some change in this list to make it shorter might be possible preferable.

A. Kobbo

1. White Wonder Trailing
2. Ex-Kenya
3. TVu 1977
4. Black Eye Bean ex-Debre Zeit

All except Black Eye Bean ex-Debre Zeit are somewhat late in flowering and maturity. If rains are early use 1-3 if they are lare use 4. If one variety should be excluded take away ex-Kenya.

B. Nazareth Area

Cowpeas do not compete well in terms of yield with haricot beans. However, White Wonder Trailing and TVu 1502 are most promising. Two other varieties which have also given good results are ex-Kenya and 62-157-00460.

C. Melka Werer

Yields are generally high to very high promising a food crop in rotation with cotton, especially as it is not sensitive to high temperatures and can be grown any time of the year (which is not possible with haricotbean or with mungbean). No quite clear pattern on varieties, however, White Wonder Trailing has always been among the best yielders.

Others of interest are:

TVu 201 - OD
TVu 3629
TVu 1977 - ID
TVu 335

D. Gode

Two varieties have been selected for use in cultural trials: TVu 335 and White Wonder Trialing. TVu 335 has been preferred by the settlers and are grown by them. Cowpea is so far the highest yielding pulse crop for the Gode area.

The two most important cultural practices in order to get good results with any of the crops are:

1. Proper Weed Control

2. Early Sowing

List of Pulse Species Incorporated In
Ethiopian Pulse Research/Trial Programs

*1.	Chick Pea	Cicer arietinum
*2.	Field Pea	Pisum spp.
*3.	Horse Bean	Vicia faba
*4.	Lentil	Lens esculenta
*5.	Haricot Bean	Phaseolus vulgaris
*6.	Grass (Rough) Pea	Lathyrus sativus
*7.	Fenugreek	Trigonella foenum-graecum
*8.	Lupin	Lupinus spp. (L. albus)
*9.	Cow Pea	Vigna unguiculata
*10.	Pigeon Pea	Cajarus cajan
*11.	Hyacinth Bean	Lablab purpureus
*12.	Mung Bean	Vigna radiata
*13.	Soya Bean	Glycine max
14.	Adzuki Bean	Vigna angularis
*15.	Lima Bean	Phaseolus lunatus
*16.	Sword (Jack) Bean	Canavalia spp. (C. ensiformis)
*17.	Velvet Bean	Mucuna nivea (M. Pruriens cv. group utilis)
18.	Rice Bean	Vigna umbellata
19.	Cluster Bean	Cyamopsis tetragonaloba
*20.	Bambarra Groundnut	Voandzeia subterranea
21.	Horsegram	Macrotyloma uniflora
22.	Black Gram (Urd)	Vigna mungo
*23.	Scarlet Runner Bean	Phaseolus coccineus
24.	Mat or Moth Bean	Vigna aconitifolia
*25.	African Yam Bean	Sphenostylis stenocarpa
26.	Tepary Bean	Phaseolus acutifolius
27.	Winged Bean	Psophocarpus tetragonolobus
*28.	Ground Nut	Arachis hypogaea

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* These species are at present grown in Ethiopia.