

NATIONAL SORGHUM AND MILLET
CROP IMPROVEMENT PROJECT

YEMEN



PROJECT 030

APPROVED:

DATE:



11/28/76

11 8

NATIONAL SORGHUM AND MILLET CROP IMPROVEMENT (030)

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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET TO BE COMPLETED BY ORIGINATING OFFICE		1. TRANSACTION CODE ("X" appropriate box)		PP <hr/> DOCUMENT CODE 3
2. COUNTRY/ENTITY Yemen Arab Republic		3. DOCUMENT REVISION NUMBER		
4. PROJECT NUMBER 279-0030		5. BUREAU a. Symbol NE b. Code 4		6. ESTIMATED FY OF PROJECT COMPLETION FY 8 1
7. PROJECT TITLE - SHORT (stay within brackets) [Sorghum and Millet Crop Improvement]		8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL ^{mo. yr.} 11 76 b. FINAL FY 8 0		

9. ESTIMATED TOTAL COST (\$000 or equivalent, \$1 =Yr 450)

a. FUNDING SOURCE	FIRST YEAR FY <u>76</u>			ALL YEARS		
	b. FX	c. L/C	d. Total	e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	1,050		1,050	2,707		2,707
(Grant)	(1,050)	()	(1,050)	(2,707)	()	(2,707)
(Loan)	()	()	()	()	()	()
Other						
1.						
U.S.						
2.						
HOST GOVERNMENT		391	391			1,088
OTHER DONOR(S)						
TOTALS	1,050	391	1,441	2,707		3,795

10. ESTIMATED COSTS/AID APPROPRIATED FUNDS (\$000)

a. Approp-riation (Alpha Code)	b. Primary Purpose Code	c. Primary Tech Code	FY <u>76</u>		FY <u>Int. Q.</u>		FY <u>77</u>		ALL YEARS	
			d. Grant	e. Loan	f. Grant	g. Loan	h. Grant	i. Loan	j. Grant	k. Loan
FN	112	072	1,050	--	285	--	360	--	2,707	--
TOTALS			1,050		285		360		2,707	

11. ESTIMATED EXPENDITURES 450 320 680

12. PROJECT PURPOSE(S) (stay within brackets) Check if different from PID/PRP

Establish a national coordinated sorghum and millet crop improvement program.

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

Yes No

14. ORIGINATING OFFICE CLEARANCE		15. Date Received in AID/W, or For AID/W Documents, Date of Distribution	
Signature:		mo. day yr. mo. day yr.	
Title: Sector & Project Planning Staff NE/TECH			
Date Signed: 12 13 75		mo. day yr.	

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT PAPER FACESHEET
 TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE (CHECK APPROPRIATE BOX)
 ORIGINAL CHANGE
 ADD DELETE

PP
 DOCUMENT CODE
 3

2. COUNTRY/REGIONAL ENTITY/GRANTEE
 Yemen Arab Republic

3. DOCUMENT REVISION NUMBER

4. PROJECT NUMBER: 279-0030

5. BUREAU
 A. SYMBOL: NESA B. CODE: 4

6. ESTIMATED FY OF PROJECT COMPLETION: FY 81

7. PROJECT TITLE - SHORT (STAY WITHIN BRACKETS)
 [Sorghum and Millet Crop Improvement]

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION
 A. INITIAL: 11/76 B. FINAL FY: 81

9. SECONDARY TECHNICAL CODES (MAXIMUM SIX CODES OF THREE POSITIONS EACH)

072 074 084 023

10. ESTIMATED TOTAL COST (\$000 OR EQUIVALENT, \$1 = Yr. 450)

A. PROGRAM FINANCING	FIRST YEAR			ALL YEARS		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL (GRANT)	1,132		1,132	2,789		2,789
(LOAN)						
OTHER 1.						
U.S. 2.						
HOST GOVERNMENT		391	391			1,088
OTHER DONOR(S)						
TOTALS	1,132	391	1,523	2,789		3,877

11. ESTIMATED COSTS/AID APPROPRIATED FUNDS (\$000) *Does not include

A. APPROPRIATION (ALPHA CODE)	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE	FY 75		FY Int. OTR		FY 77 PROJECT QIP YEARS				
			D. GRANT	E. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN	J. GRANT	K. LOAN	
FN	112	072	1,132		104		361				2,789
TOTALS			1,132		104		361				2,789

12. ESTIMATED EXPENDITURES: 480 320 680

13. PROJECT PURPOSE(S) (STAY WITHIN BRACKETS) CHECK IF DIFFERENT FROM PID/PRP

[Establish a national coordinated sorghum and millet crop improvement program.]

14. WERE CHANGES MADE IN THE PID/PRP FACESHEET DATA NOT INCLUDED ABOVE? IF YES, ATTACH CHANGED PID AND/OR PRP FACESHEET. N/A, facesheets were not required at the time.
 YES NO

15. ORIGINATING OFFICE CLEARANCE

SIGNATURE: *Clyde S. Adams*

TITLE: Food and Agriculture Officer

DATE SIGNED: MO. 09 DAY 20 YR. 75

16. DATE RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MO. DAY YR.

I.B. Recommendations

It is recommended that the Project presented in this paper be approved, that the approval process be completed by November 1975, and that the entire FY 76 allotment be received by the Mission by December 15, 1975. The timing is necessary because the predecessor project, 018, will exhaust its funds during December. The comparatively large initial year allotment is required to lessen the time gap between 018 and the initiation of this Project by allowing personnel contracting, purchase of commodities, participant training and the construction of sub-stations (other costs) begin as early as possible.

Crant and total Project not counting	
Project 018	\$2,707,000

C. DESCRIPTION OF THE PROJECT

This project addresses a high-priority target of the Yemen Arab Republic Government (YARG): increase of agricultural productivity, through concentrating on two crops (Sorghum, Millet) which are staples in the Yemeni rural subsistence economy.

Cultivation of these two crops is so wide-spread and the dietary needs of rural Yemeni are so dependent on their increased production, that emphasis on improved yields per hectare will meet both equity and economic goals of YARG and AID. While equity benefits are difficult to access at this time, we have attempted to cover this aspect in the "Social Consequences & Benefits Incidence" section of this document (see page 31). Further we anticipate requesting TDY assistance in analyzing sector wide equity consideration including land tenure aspects.

The project centers on adaptive research, including off-station testing in field conditions, of improved varieties of Sorghum and Millet. It will also provide for linkages to those projects, extension, and seed production activities which the YARG in collaboration with other donors and/or USAID has under development. Finally, it is designed to contain a participant training component aimed largely at establishing the skills-capacity to ~~man~~ a research institution sometime in the near future.

In summary, the project will have the following characteristics:

1. A National Sorghum and Millet Crop Improvement Program under the sponsorship of the Ministry of Agriculture.
2. Coordinated with other Donors:

In recent discussions with Ministry and CPO officials, it has been made clear that if AID moves on a quick and timely basis, the YARG will rely upon AID to take the lead in sorghum and millet work in the Yemen under coordinated arrangements with other donors.

Discussions with UNDP/FAO, IBRD, and the Federal Republic of Germany (FRG) officials in the Yemen indicate that they see their roles as limited to participating in regional trial work. In some areas, such as Taiz, Hodeidah, Zabid, and Saada, they expect the AID-assisted project to conduct trials on sub-stations that the FAO and the FRG have established. Further, if the UK follows up its Inter-Mountain Plain Study with a project, they also wish to participate.

3. Technical Assistance from AID over a five year period in order to:

- a. Identify and field test under varying local conditions a number of high-producing varieties of Sorghum and Millet, particularly suited to semi-arid or low rainfall circumstances.
- b. Move locally tested high-producing varieties into the hands of farmers wherever feasible through various donor and USAID-assisted projects.
- c. Develop a central sorghum/millet research facility together with two to three modest sub-stations.
- d. Identify and test-relate cropping practices which may further increase the productivity of selected varieties. Considerable benefits are anticipated, over the long term, in cultivation and tillage practices leading to moisture conservation and local rainfall retention. Not only will this lessen moisture stress during drought periods but also permit greater fertilizer utilization. In the short run it is not anticipated that fertilizer will be used extensively and the success of this project is not keyed to large utilization of fertilizer.
- e. Development of a seed production capability.
- f. Gather farm budget economic data concerning Sorghum and Millet production and consumption under varying sets of conditions.

TDY assistance (see US Inputs Section) will be utilized to set up simplified farm management studies which can then be carried out by regular full time project staff.

- g. Train counterpart Yemeni staff to undertake the foregoing and, also, to prepare ultimately for the creation of a national agricultural research institution.
4. An AID-financed technical assistance and participant training input of:
- a. Sorghum/millet breeder 72mm. (contract)
 - b. Agronomist/extension specialist 72mm (contract) —

- c. Three Station Technicians 192mm. (contract with IVS)
 - d. Agricultural engineer 60mm. (contract with IVS)
 - e. Plant protection specialist 18mm. (contract)
 - f. Seed production and handling 12mm. (contract)
 - g. TDY to be determined 15mm. (contract)
 - h. Participant training at ALAD 112mm.
 - i. Participant training, academic, in 3rd countries 245mm.
 - j. Participant training, academic, and practical in U.S. 60mm.
5. An AID-financed commodity and other-cost input of:

U.S.\$1,026,000 to cover:

Farm machinery
Irrigation equipment
Vehicles
Research equipment and supplies
Wells
Pumps and engines
Fencing
Buildings
Miscellaneous.

6. Total USAID inputs are \$2,707,000.

7. A YARG-financed contribution of U.S.\$1,088,000 in Riails plus substations to cover a 25% cost of the project.

It is expected that at the end of the first five years, the project will, at the minimum :

- 1. Increase overall national per hectare yield of Sorghum and Millet by 3%. It is not anticipated that this will have much effect on either prices or cropping pattern shifts. However, as the per hectare yields increase from 3% to 10% or 25% either significant price declines or cropping shift could occur. It is likely that some of both effects will be likely combined with some feeding of Sorghum to livestock.

2. Identify, test, and begin to distribute Sorghum and Millet varieties capable of boosting production in semi-arid areas by more than 20% under farmer conditions. (Varieties are already identified which yield 200 to 300 per cent over local varieties on limited research trials.
3. Establish and equip a research station network including a 10-hectare main station and 2 or 3 sub-stations of 10 to 20 hecatres in size.
4. Link the outputs of proved production technology for Sorghum and Millet varieties in with established agricultural extension services and the developmental projects of other donors.
5. Accumulate and assess economic data concerning on-farm tests of Sroghum and Millet production and related consumption data under a number of varying conditions.
6. Develop the basics of a seed production system.
7. Establish the foundations, (in terms of trained staff and Sorghum-Millet research systems) for a national research institution that could either be fitted into a comprehensive agricultural research center or become the basis for creating such an entity.

SUMMARY FINDINGS

Every Yemeni rural family is dependent upon Sorghum and Millet production for human and animal food consumption. These are the two highest total value crops produced in the Yemen and they are grown in all parts of the country.

Yet, in recent years, their production has varied widely due to extraordinary rainfall conditions. The Yemeni are anxious to boost production in good rainfall years so that they may be able to accumulate _____ reserve food stocks for humans and animals as well. This reserve is usually placed in a hole in the house floor and is used for private consumption, not for commercial purposes.

In some areas, given increased capacity to produce Sorghum and Millet per hectare, Yemeni farmers will shift to wheat production. Urban _____ is, increasingly, dependent upon wheat and foreign exchange reserves are constantly drawn down to import this grain.

Experience learned during the past three years in a modes AID-supported varietal identification and test project for Sorghum and Millet signals the possibility that improved, high-producing, varieties of Sorghum and Millet can be introduced in the Yemen.

The YARG attaches high priority to such an effort, other donors agree, and technical evaluations held on the subject in the recent past indicates that varietal improvement in these two crops is possible.

E. PROJECT ISSUES

The principal issues brought up at one time or another either in Sana or by AID/W may be summarized as: priority; relevance; equity; a five-year life of project; manpower requirements - YARG; manpower requirements - USAID; and Logistic Bankup Requirements - USAID. Our reply to these individual items follows:

1. Priority

The Central Planning Organization of YARG and the Ministry of Agriculture attach great priority to this project because they are concerned about more reliably insuring the size of the domestic food supply reserves of the rural Yemen. They are also of the opinion that increased production of Sorghum plus extension of Millet cultivation to some areas now unutilized will:

- a. release acreage for higher unit value crops returning more income per unit of land, labor, capital, and water;
- b. enhance chances for agricultural diversification, resulting in improved care of the soils and enhanced human nutrition; and

- c. reduce dependency on certain kinds of cereal grain imports, especially wheat.

We share these concerns; but attach a special priority based on the view that an identification with and understanding of Sorghum and Millet production problems over the next years will, in the same way as has happened in USAID-supported water supply activities, bring USAID-supported agricultural activities into:

- a. direct assistance to the bulk of the bulk of the poorer classes of the Yemeni farmers everywhere;
- b. active participation in rural development programming in a way that is immediately meaningful to the YARG and Yemeni farmers alike;
- c. working relationships of an effective nature with all donors operating in the agricultural sector; and
- d. a fact-gathering capability in respect to the economics, _____, marketing, etc., of Yemen's two most crucial crops.

2. Relevance

The proposed project fits precisely with the YARG's agricultural policy as defined in the "Three Year Program". We cite four elements and discuss below how we see the relationship of this proposal to the strategy as stated:

- a. Strengthen the Ministry of Agriculture by expanding training and field experience opportunities. This project as a subsidiary operational unit under the joint management of USAID and YARG will require a minimum management input of the Ministry. However, the participant training and on-the-job work experience that will be available to project staff will provide the base upon which to develop future policy working personnel. The project goals have been deliberately placed at modest levels to ensure adequate attention to personnel development rather than establish an environment keyed only to variety or production targets.
- b. Improve the scientific and professional expertise in agriculture.

This project both in participant training and follow-on in-service experience will establish a scientific and extension capability for the two major crops of the Yemen. The project will also sponsor professional interchange between the Yemeni project staff and the international research community thereby establishing linkages for continued professional growth.

- c. A strong push in the Montane plains and the Tihama.

This project seeks to increase the productivity of two crops which also grow in the geographical areas mentioned in the three year plan. But it does not focus on those two areas. Instead, it addresses the entire cultivatable area of the country and, if it succeeds, it should improve the chances for other donor agencies to more effectively promote other cash crops in the Montane plains and the Tihama. This will be accomplished through attaining greater production per hectare and bringing marginally used hectarage (in the case of millet) into cultivation.

- d. Raise the nutrition standards for all citizens.

Assuring adequate supplies of Sorghum and Millet in Yemeni rural diets is, at least, a minimal way of preserving _____ nutrition standards for Yemeni citizens. If this effort also results in the introduction of edible pulses on some scale, and the freeing up of hectarage for other crops, the project will advance nutrition to a degree which cannot be calculated at this time, but which should be quite significant.

3. Equity

As we observe in the section on 'Social Consequences and Benefit Incidence' in this document, it is not possible to draw a clear perspective on this subject. Much will depend upon whether present intentions to adapt varieties clearly intended to work well in local areas can be realized in practice and whether appropriate methods of dissemination can ultimately be introduced _____ in all rural areas no other two crops are _____ virtually all farmers for their daily subsistence.

4. 5-year Life of Project

This involves an interpretation of what is desirable and what is possible. During his evaluation of the O18 Project, Dr. Leland House made it quite clear that any expanded, nationwide, activity with Sorghum and Millet production improvements should be cast in a twenty-year context.

We agree with his views; but it was our impression that Congressional as well as AID/W policy constraints force much shorter time perspectives in project design and obligations. Accordingly, we set the project up in a five-year time frame and called for an intensive evaluation at the end of three years. It was our thought that an evaluation at that time should provide the basis for a further extension of the project based upon performance at the time of the evaluation.

We are still adhering to an initial five-year time frame together with an evaluation at the end of three years. But we have restated the project's goals in such a way that it will be clearly understood that effective institutionalization of research, the development of appropriate dissemination systems, and the testing and development of high-yielding varieties of Sorghum and Millet suited to minimal climatic and cultivation practices in the Yemen may require as many as twenty years.

5. Manpower Requirements - YARG

As may be noted when reading the section in this document entitled "Analysis of the Recipient's and AID's Administrative Arrangements" we are quite concerned about the YARG's capacity to meet the manpower requirements of any Technical Assistance project in agriculture. We note that the 'big' projects such as the newly established IBRD/FAO Southern Uplands Rural Development activity inevitably tend to draw more Yemeni attention to meeting manpower obligations than do smaller projects such as the one we propose.

On the other hand, we know that these two crops are of great importance and that YARG officials in the CPO and Ministry of Agriculture attach high value to work on these two crops. Therefore we anticipate that they will try to give us the best support possible under admittedly trying conditions for them.

We have, accordingly, tried to reduce the initial manpower burdens on the Ministry of Agriculture as much as possible without doing damage to the cause of developing competent counter-parts. But we admit that this whole subject will continue to be a very troubling one in all Technical Assistance projects in the Yemen for years to come. It will be the subject of special attention in annual evaluations.

The YARG is very concerned with this issue, especially with regard to the Ministry of Agriculture, and one of the functions of the IBRD advisory team to the Ministry is to focus on the problem. The team has recommended to the YARG that 400 secondary school graduates be recruited and sent to surrounding countries for B.S. degree training at the rate of 80 per year for the next five years. USAID is strongly supporting this plan and is financing (under 020 project) an initial 25 students starting in the fall of 1975. A considerably large number of secondary school graduates will be selected by the YARG for diplomate training in agriculture.

6. Manpower Requirement - USAID

This project is to be implemented by a contractor with the assistance of IVS and YARG counterpart. With this implementation plan the workload of USAID will consist of facilitating liaison and coordination with YARG and other donors, contract support and evaluation, and also programming of TDY or other inputs for future years as found to be required for implementation. The staff of the Agriculture Division, consisting of two agricultural officers, is considered to be capable for support of the poultry project; this project when approved; the development, and implementation if approved, of a horticulture project; and a significant amount of general assistance to the Ministry of Agriculture and to USAID. ---

However, given the conditions of the Yemen with its under staffed Ministry of Agriculture, relatively poor roads and communications, and generally poor infrastructure it is not expected to be easy to monitor nor evaluate this project or any other agriculture project. The senior staff of the Mission intend to carefully monitor these aspects in order to ensure timely and effective support.

7. Logistic Back-up Requirements - USAID

The Mission has recently strengthened its staff significantly with the arrival on board of an Executive Officer and a GSO Official (Workshop Maintenance). These positions are particularly necessary in the Yemen to provide the logistic back-up to the technical offices and the project contractors. We are concerned that these services are adequate and will be given special attention to support operations in order to ensure the highest possible level of project performance.

PART II PROJECT BACKGROUND & DETAILED DESCRIPTION

A. BACKGROUND

The origin of this proposal goes back to discussions held between YARG officials and an AID/W team which reviewed the situation and needs of Yemen in September, 1972. One of the priority requests for assistance made by the Government at that time was for help in improving sorghum and millet yields. These are the major subsistence crops of Yemen and provide the livelihood of the majority of peasant farmers.

Out of this request came an approved PROP dated February 12, 1973 which envisioned a two-stage project, i.e., adaptive research followed by dissemination. The PROP provided funds for only Phase One

and directed that Phase Two would not be approved until after an evaluation had been made of the first phase.

The project was planned, coordinated and implemented. Sorghum plantings were made in 1973 by TDY staff and generous and able assistance was made available from the Arid Lands Agricultural Development (ALAD) program in Beirut. The first USAID-financed technician arrived in September 1973 in time to oversee the harvesting and evaluation of the first crop year results. Throughout 1974 evaluation of planting methods, seeds and harvests continued.

In January/February 1975 a detailed evaluation of the project was carried out by a technical team from AID/W and the Arid Land Agricultural Development (ALAD) staff in Beirut in cooperation with USAID, Ministry of Agriculture (M/A) and Central Planning Organization (CPO) officials. (See Annexes 7 and 8.) From this evaluation came the recommendation for a greatly expanded project which would emphasize sorghum and millet crop improvement work nationwide along with edible legumes and pulses as rotational crops. The project would build on the previous work done under Project 018 and would seem to institutionalize activities related to sorghum and millet.

B. DETAILED DESCRIPTION

The dominant cereal and main foodstuff of Yemen is DURA (Sorghum sp.). Next in importance is millet, DUKN (Pennisetum sp.). Between them, these two crops occupy 50 to 67 percent of all the cultivated land in the Yemen (depending upon the crop year) and they supply a very high proportion of the cereal grains and forage intake of both humans and animals. Their cultivation engages the energies of nearly all peasant farmers in the Yemen.

Sorghum and millet are crops specially suited to the low rainfall and soil conditions of the Yemen. Sorghum requires a minimum of 250 mm. (10") of rainfall and millet requires even less, 150 mm. (7").

As has been pointed out in recent FAO studies, the narrow range of crops produced in Yemen is probably best explained by attention to the restrictive soils environment. The wide distribution of finely divided calcium carbonate in the loess-like soils and the universally high pH (about 8.3) may well be limiting for many crops, either directly through high pH or indirectly through low solubilities of essential plant nutrients under these alkaline conditions.

Sorghum and millet appear to flourish in these circumstances, particularly those varieties that have evolved over the centuries and adapted themselves to the Yemen. Evidence suggests that most of the

agricultural lands have been cropped for at least the past 2,000 years. As a consequence, Yemeni farmers show an awareness of soil depletion conditions. They use crop rotations and mixed cropping, rotating sorghum with wheat, barley, and alfalfa, and interplanting sorghum with beans, mustard, and pumpkins.

Both sorghum and millet are hardy. Their yields vary between 1,500 kilograms per hectare in the wetter south of the country and 800 kilograms per hectare in the more arid north.

Both are the major providers of calories and protein in the Yemeni diet. Their contribution to total calorie supplies is estimated at 75 percent and to total protein 72 percent per village consumer. Estimates from the villages show a daily cereal consumption of about 400 grams per capita. This constitutes about 70 percent of the total per capita food intake per day.

There has been little or no research on the adaptation of high-yielding foreign varieties of sorghum and millet to Yemeni conditions. Nor has there been any basic breeding of new varieties. Foreign production of these two crops shows much higher returns per hectare than in the Yemen. For example, in the United States the average sorghum yield in 1971 was more than double that of the best in Yemen. The figure in the United States was 3,180 kilograms per hectare.

While research has thus been neglected in the Yemen, population growth and increased consumer demand sparked by remitted monies from Saudi Arabia are tending toward annually higher food deficits. Today, more than 50% percent of the annual import bill is for food. This amounted to \$120 million in 1974, of which \$50 to \$60 million was for cereal grains alone (mostly in the form of wheat and wheat flour which increasingly is becoming the cereal of choice by urban consumers.)

As a consequence of this situation, the IBRD has recommended that the YAR devote attention to policies designed to improve domestic cereal production. The YARG's Three-Year Plan reflects this same concern through general emphasis upon:

- Increased agricultural sector income;
- Provision of a wider variety and increased quantity of domestically grown food crops, livestock, and poultry; and
- Preservation of foreign exchange through agricultural import substitution and/or export.

In the instances of sorghum and millet, while the annual amount of agricultural water available in the Yemen is the principal technical constraint on any sustained increases in all forms of agricultural

production, it does appear that adapted foreign varieties accompanied by appropriate cultivation practices might score major production gains. These potentials are calculated by specialists to comprise a range involving at least a doubling of production per hectare in the wetter portions of the country and a possible tripling of production, per hectare, in the more arid areas if moisture conservation techniques developed elsewhere in the world can be successfully adapted to the Yemen.

But to successfully mount sustained varietal testing in these matters, in the case of Yemen, it is necessary to both initiate testing and the creation of an institutional structure that will sustain the testing and later institute crossing of the best Yemeni and introduced varieties. Further, the institutional structure should also be capable of networking with other Yemeni and foreign-supported agricultural projects so that dissemination of tested/proven varieties will be facilitated.

As indicated in the background section above, discussions between the YARG and the USAID have led to execution of project activity in this area.

As a consequence of that AID-assisted activity, over 5,000 different varieties of sorghum and millet have been tested and evaluated during the 1973/74 crop years. Further testing this crop year (1975) is expected to identify five or six varieties which can go into large-scale off-station trials throughout Yemen during 1976. Some limited off-station work is being conducted this year in the areas between Sana and Taiz, Sana and Hodeida (Haimah area), Sana and Amran, and in the Sadah area.

The target yield for the varieties to be released by this project is set at 120% of the yield of the varieties now grown where cultivation practices are unchanged. Yield increases of 2-3 times the present average yield have been realized in the experimental farm. With this potential established in the preliminary variety trials, the decision was reached to fully exploit the sorghum and millet crops.

The project formulated by YARG and USAID are expressed in detail in the Logical Framework (Annex One). To simplify, this project will seek:

- to increase farm production thereby improving farm incomes and reducing national import requirements for the food account of the Yemen.
- to initiate the establishment of a national coordinated program for sorghum and millet crop improvement.

This will be accomplished through parallel courses of action. On the one hand, USAID will assist in the establishment of a small research station network and the training of qualified

Yemeni staff to man the network. On the other hand, USAID will promote varietal trials, cultural practice trials, rotational crop experiments, and off-station field trials all addressed to identification and proving of varieties of sorghum and millet with working linkages capable of widespread dissemination.

PART III PROJECT ANALYSIS

A. TECHNICAL ANALYSIS INCLUDING ENVIRONMENTAL ASSESSMENT:

1. We regard this project as technically sound and appropriate to Yemeni conditions for the following reasons:

- a. Sorghum/millet acreage utilizes 50 to 67 percent of all cultivated land in Yemen and engages nearly all peasant farmers. The crops are eminently suited to Yemeni climatic and soil conditions and they loom large in the Yemeni daily diet.

Per hectare yield increase of these grains offers the single best opportunity for improving farm income, affecting the nutrient content of the Yemeni diet, and lessening the foreign exchange drain.

- b. In the latter case, the situation will be favorably affected by the fact that increased yields of sorghum and millet could result in release of some lands for use in producing other crops such as wheat, barley, horticultural crops, oil seeds, etc. Even a very modest three percent national yield increase over the next five years could release approximately 25,000 additional hectares for use on other crops.
- c. The project is also expected to shift some sorghum and millet acreage to land now considered marginal for crop production. This will occur through development of varieties suited, in some cases, to very low moisture conditions; and the introduction of special moisture conservation techniques.
- d. The project utilizes world-tested technologies which have proven successful in other LDCs and among Developed Countries. Adaptive research will be conducted at three research sites jointly established by the YARG and USAID. The best local varieties will be used and compared with promising varieties introduced from worldwide sources. Improved cultural practices such as timing of planting, cultivation, fertilization, moisture use, and conservation will be tested. The international crops research centers supported by multilateral and bilateral agencies, the foundations, and individual governments will be valuable sources of varieties and practices.

- e. Sufficient experience has already been accumulated in the smaller predecessor project (018) to provide assurance that the approach chosen is a correct one.
- f. Experience earned in other new variety introductions such as the West German test and dissemination of potatoes indicates that the Yemeni farmer is enterprising and will adopt new varieties and accompanying technologies when convinced that they are feasible. Thus, the essential emphasis upon field testing and demonstration under operational conditions is a valid "engine of change" in the Yemen.
- g. The project will also involve seed increase efforts. It will be done, initially, through the project since there is no seed industry of any kind in the Yemen at this time. It is anticipated that, eventually, seed production efforts will be taken over by the private sector.

Larger farmers will be used both for "off station" trials (since they can better afford a degree of risk-taking) and for initial seed multiplication efforts, since staff will not be available to monitor seed-growing efforts (necessary to maintain both genetic purity and avoidance of weed and other contamination) of a large number of very small growers. The project itself will grow seed for initial multiplication and then release it to selected growers. In addition, during early years of the project, commercial quantities of seed may be acquired from the country of introduction.

- 2. The environmental implications of the project, in our judgment, will be positive and beneficial because:
 - a. The two crops are highly suited to Yemen's soil and water conditions. They respond well to varying rainfall patterns. Their root structure and characteristics make them conservators of moisture and they inhibit rapid runoff of heavy rainfall. They, therefore, tend to act as soil conserving crops of some importance.

- b. Both crops are cultivated by small as well as large landholders. Therefore, their usefulness to all income classes is a common factor. Coupled to this is the fact that sorghum, in particular, is highly useful as a forage crop for animals. This, in turn, favorably benefits large and small cultivators owning and controlling draft or food-source animal stocks.
 - c. The potential crop diversification and rotation implicit in the introduction of higher yielding varieties of sorghum and millet can have a beneficial effect on soil conditions because other crops of importance to Yemen can be introduced on a wider scale.
 - d. The proposed moisture conservation practices that will be introduced will help to protect marginal soils and bring more of the latter into cultivation.
3. The technical design of the project appears reasonable to us, as do the cost estimates, for the following reasons:
- a. During the first five years of the project's life, management and staffing aspects are arranged in such a way as to throw a minimum burden on a small Ministry of Agriculture. Yet, through emphasis on participant training in particular it may be possible to lay the basis for future institutionalization of research.
 - b. The project will bring two senior foreign technicians (a plant breeder and an agronomist) to the Yemen for five years; a plant protection specialist for 18 months; a seed production specialist for 12 months; and 15 man-months of specialized TDY expert attention. Four IVS (volunteers) agricultural specialists will be present for five years each.
 - c. The project will pick up and absorb the currently successful Sorghum Development Project, 018.
 - d. The proposed project is arranged according to the expanded designs recommended by a detailed Evaluation of the Sorghum Production Project carried out in January, 1975 by a team that included Dr. Leland House of ALAD, Beirut.
 - e, f. The total of 417 man-months of participant training either at ALAD, in academic training among Arab countries, or in the United States seems a balanced approach that should provide a "core" of trained talent by the end of the project.

4. The project meets the requirements of FAA Section 611(a), (b).

B. FINANCIAL ANALYSIS AND PLAN:

1. Financial Rate of Return/Viability:

Given the paucity of firm economic data of any kind in the Yemen, objective analysis of the financial rate of return which might be expected from this project is neither feasible nor possible.

A crude analysis at the macro level:

a. A 3 percent National Yield Increase -

An increase of this magnitude (probably easily attainable) after five years of work in sorghum alone would result in:

-a 35,000 metric ton additional supply of sorghum, valued at \$2,983,000 at current prices for July, 1975 Chicago while

-the projected five-year U.S. inputs will total \$2,707,000 for the entire activity.

b. Foreign Exchange adjustment -

The level of increase as postulated in (a) above could release sufficient land for cultivation in wheat at a foreign exchange savings of approximately:

-\$3,150,000 at current Chicago prices on that grain.

The micro-level analysis for cultivation of high yielding varieties of sorghum and millet;

-under the present project plan the released varieties will be capable of higher production without major change or cost increase for the production methods. In other words the only increase in costs will be the cost of seed which will be more than offset by the 20-50 percent increase in production anticipated. As project objectives are shifted toward higher production levels a more complex analysis of new cultural practices, fertilization, irrigation, etc., will be studied and set against increased production. These more advanced

stages of the project will be undertaken with attention to farm management and economic analysis compiled with due regard to the experience gained in the initial years of extension and farmer cultivation.

2. Recurrent Budget Analysis of Implementing Agency:

Yemen's budgetary situation is extremely weak. It is vulnerable because of a small tax base and an increasing dependency on foreign aid even in financing current expenditures. At the same time,

because the Central Budget Bureau is a new institution (created in 1972) it is not easy to discern just what the current data portends. However, it is possible to note the following relevant circumstances:

- a. The principal source of tax revenues is customs duties and other taxes on international trade. Some 75 percent of the national tax revenues come from this source. Since Yemen has been experiencing a constant increase in the annual import levels per year as contrasted with exports, the importance and significance of this tax source cannot be minimized.
- b. Simultaneously, Yemeni current and development expenditures per year have been running far ahead of income. Approximately one-fifth of the current budgeted expenditure is in deficit.
- c. Meanwhile Yemen receives approximately \$200 million per year in emigrant remittances. This situation permits Yemen to run a free foreign exchange market; and, at the moment, Yemeni free foreign exchange reserves are rising. They stood at \$132 million in June 1974.
- d. As of June 30, 1974 Yemen's total contracted foreign debt was \$358 million. This figure includes loans from Saudi Arabia for current operating budget support; and an approximate 55 percent of the total owing to the Soviet Union and the People's Republic of China.
- e. The Government's Three-Year Development Plan calls for a 14.8 percent investment in agriculture or approximately \$35,000,000, while at the same time current operating budgets assigned to support the 428-member staff of the Ministry of Agriculture approximate \$100,000 per year.
- f. Under these circumstances, each foreign donor agency must move with great circumspection when establishing increased financial demands upon current operating costs of Yemeni governmental institutions. In this particular case it is estimated that the proposed varietal testing and institutional development over the five-year span will require an input of \$1,088,000* from the Yemeni government. The vast majority will come from the Yemen developmental budget leaving only a minimal increase in the operating budget.

3. Financial Plan/Budget Tables:

These figures are provided in detail in Annex 2. Following, we present a Summary Table concerning these figures:

*Not including sub-stations.

SUMMARY TABLE (1)

		<u>U.S. Inputs</u>						
		<u>FY76</u>	<u>INT</u>	<u>FY77</u>	<u>FY78</u>	<u>FY79</u>	<u>FY80</u>	<u>Total</u>
Technicians								
	MMF	147	15	84	84	77	34	441
	MMOB	48	21	84	84	68	79(45)	429
	\$ 000	262	51	246	258	256	152	1225
Participants								
	MMF	78	43	71	81	96	48	417
	MMT	42	33	96	57	72	96(21)	417
	\$ 000	78	45	80	83	110	60	456
	Other Costs \$ 000	600	97	20	10	20	20	767
	Commodities \$ 000	110	92	14	15	14	14	259
	Project 018	270	-	-	-	-	-	270
Total \$000:1050		285	360	366	400	246	2977*	

*Includes Project 018

- (1) Includes annual inflation of 5% for technicians and participants, 10% for commodities and other costs.

YARG Input:

(\$ 000)

		<u>FY76</u>	<u>INT</u>	<u>FY77</u>	<u>FY78</u>	<u>FY79</u>	<u>FY80</u>	<u>Total</u>
Land								
(Value to be determined)								
	Project 018 ^{1/}	236						236
	Salaries	76	24	84	84	84	85	437
	Equipment Costs	44	11	44	44	44	44	231
	Facilities Maintenance	35	9	35	35	35	35	184
Total:		155	44	163	163	163	164	1088

^{1/} Land, Salaries, & Incidentals

4. Summary Opinion:

Given the foregoing observations and financial plan, accompanied at all times by the point that YARG data as well as plans are often quite indefinite, the proposal seems a modest start aimed at meeting a potentially worthwhile need. It does not place a large strain on either the YARG's developmental or current budgets projected for the next five years. It lays the basis for possible institutional expansion and probable acceleration in sorghum and millet activities at levels which very well may exceed the modest 3% minimum goal stated.

C. Social Analysis:

Social analysis of this project is addressed to all three of the broad considerations associated with an investigation of this subject. But it must be understood, at the outset, that any analysis concerning rural Yemen is severely constrained by lack of organized scholarly knowledge concerning: social systems; political administrative structure; motivation; land tenure practices; leadership/authority; and mobility. The Yemen contains so many micro-ecologies and differing social conditions that generalizations have quite limited value.

The Mission is duly concerned about the weaknesses of the socio-cultural dimensions of project design and are continuing to search for ways and means of more effectively addressing these aspects. In the meantime project implementation is to proceed. As a Mission Strategy socio-cultural factors are to be studied independently and in the course of project evaluations as opportunities for collaborative approaches can be identified. With the traditional male dominant culture of the Yemen we are not sanguine about the progress that can be made. However, we recognize that the Yemeni culture is under a variety of stress, as explained below, and intend to monitor these events with some interest to identify opportunities for further study and appropriate project redesign. In this regard we have under consideration the use of TDY and/or consultancy as investigations, study or evaluation tasks are identified.

Yemeni dependence on these crops for daily food intake is intensive. They are prepared either as bread or porridge. The grains are sometimes ground at home, but more common today is the use of local milling machines on a rental basis. The cost of grinding one sack is about 2 rials. Bread is baked daily in every home for breakfast and lunch and eaten with every meal. The bread is eaten by dipping it into sauces or stews or made into special bread dishes. A typical porridge is asid, made from sorghum. This dish is prepared daily and is used daily by almost every family.

Since the Yemeni are so dependent upon these two crops for their daily subsistence, they take great care in harvesting and storing both sorghum and millet. Families in rural areas, affected by the droughts of recent years, tend to set aside large reserves of the crops after harvest. This is done through construction of more of the traditional 'Medfans' or stone storage pits by each family. Medfan's vary in storage capacity between 10 and 35 Metric Tons. They cost anywhere between \$600 to \$4,000 to construct depending upon dimensions, amount of cement used in construction, location, etc. Increasingly, one of the first things that a rural family builds with the help of family member remittances from abroad are Medfans so as to insure grain storage capacity for a long period of time.

Similarly, the Yemeni try to speedily harvest and thresh sorghum and millet so as to avoid large losses from moisture. However, in recent years, this has become increasingly difficult in many villages because so many men have moved to Saudi Arabia and elsewhere for employment. Thus, shortages of rural labor at harvest and threshing times though made good to some extent by increased use of females has resulted in cropping losses of as much as 25% in some cases. These losses arise out of the fact that the grain lies on the threshing floors, exposed to the rains, for many days before sufficient work forces can be assembled to handle the threshing. Some of the wet grain becomes infested with fungus, and mildew and has to be discarded.

As a consequence, Yemeni farmers are increasingly interested in experimenting with mechanical means of speedy threshing their grains. In this connection, the present British Technical Assistance Team's development of small hand-powered threshers at Taiz, and the current field testing of the newly designed equipment, is of great interest to many farmers. Particularly so, since the machines are designed so that they can be operated by women-who still constitute the principal and growing work force available during threshing periods.

As yet, the Yemeni government has not developed any system for large-scale storage of buffer stocks of cereal grains, including sorghum and millet. The manipulation of such buffer stocks to attain the twin objectives of insuring adequate cereal supplies for urban populations at fair prices requires very astute management and accurate statistics of crop expectations, stocks in family and commercial grainries and of price movements in all principal consuming centers. Such information is not available in the Yemen and therefore precise diagnosis of food shortages and the remedial measures required to stabilize prices cannot be determined. As a result, while increased yields of sorghum and millet can certainly be most helpful to rural families all over the Yemen, the present systems of grain marketing and storage of a commercial or governmental-controlled nature do not assure that urban cereal grain needs will be met on a reliable and fair price basis.

Yet, on the other hand, increased sorghum and millet yields per hectare can directly assist urban population cereal grain needs through the crop substitution process. That is, as yields go up per hectare, rural families can free some hectares for wheat cultivation. In recent years, Yemen's urban dwellers have shifted heavily towards the consumption of wheat as the staple cereal in their diets. While this is also occurring to some degree in the rural areas it is not so advanced. Rural people are said to still prefer sorghum and millet in their diets.

Presently, Yemen does not produce sufficient wheat to meet the growing urban demand for this cereal. Thus, a large part of the food importation bill incurred annually by the Yemen is paid for foreign wheat. To the extent that higher sorghum and millet yields frees Yemeni farmland for growing wheat on more hectares, this project can also assist the populace of urban areas.

In summary, from a socio-cultural feasibility point of view this project appears uniquely focussed on a basic component in the daily lives of all Yemeni either in rural or urban areas.

2. Spread Effects:

This subject is addressed here only from three points of view: Yemen's absorptive capacity; the Yemeni farmer's openness to innovation; and present or potential systems for dissemination of innovative technologies.

a. Yemen's Absorptive Capacity:

Given the fact that the Yemen is one of the least developed countries in the world, it should not be surprising that its absorptive capacity concerning developmental efforts is low.

Basic social overhead infrastructure, especially schools, domestic water supplies, civil service, transportation, and health are all in rather rudimentary stages of development. The following crude estimates (1972) are only indicative of the situation: 90% of the 5,237,893 population within country are subsistence farmers; 45% are not over 15 years of age; and of the 10% who are possibly literate, most did not go beyond primary school.

Developmental activities, in a modern sense, only started with the overthrow of the Imam in 1962. Prior to that time the country was cut off from the rest of the world and life remained unchanged over the centuries. Development which started with the establishment of the Republic was violently interrupted by the long trauma of Civil War worsened by years of severe draught. Only with the end of the Civil War and normalization of relationships with Saudi Arabia in 1970, did the country really get launched on the processes of development and modernization.

As it seeks to speed these processes, the Yemen Arab Republic Government (YARG) experiences great difficulty in finding qualified staff to plan, direct, and implement even the simplest of operations. While there are some excellent people at the top, they are so few in numbers that advisors from friendly Arab countries are often used in an operational capacity. The same situation is common in the private sector. Problems of skills-scarcity are all-pervasive and reach all levels of manpower - even artisans, mechanics, typists, truck drivers, as those skills are often exported to the oil-rich neighboring Arab states.

Human resources development, under these circumstances, is a priority need in the Yemen. Various multi-lateral and bi-lateral donor programs are addressed to this need in terms of specific, and large-scale, projects. All donors, because of this situation, tend to orient a portion of their projects of whatever specific nature towards a training input.

In spite of these problems, the YARG is firmly committed to development and does the best it can to assign qualified candidates as counter-parts to donor-assisted projects. However, in practice, this often means that there is a much higher percentage of expatriate participation in individual technical assistance projects than is commonly found in most developing countries.

The Ministry of Agriculture's problems of absorptive capacity are probably the most acute in the entire YARG. Government development programs are placing much more stress on agricultural growth. But a Ministry comprising only 428 employees as compared to the 4,310 in the Ministry of Education or the 2,497 in the Ministry of Health is a very small Ministry indeed.

In order to assist the Ministry of Agriculture to deal with these problems the IBRD has provided a seven-man team of advisors of whom only four are currently on board. They are to assist the Ministry on matters concerning administration, finance, and technical policy. This team has just completed a five-year training proposal, approved by the Ministry, for upgrading and expanding the staff capability of the Ministry.

Under the team's proposal, sources of trained personnel comprise the following:

- Institute training (mostly for two years beyond high school) in surrounding Arab states.
- B.S. degree training (also mostly in surrounding Arab states.)
- B.S. M.S. and other high-level training in the U.S. and Europe where English or a European language is required.
- Students returning to the YAR from non-government sponsored training. (This has averaged 5 to 8 B.S.-trained individuals per year for the past few years.)
- In-country training, mostly for extension workers. For example, training of extension workers (mostly 6 to 9 months for individuals with about nine years of education) is being carried out by FAO in Taiz and Hodeida, and IBRD in Zabid. To date, 20 individuals have completed training, 65 are planned for this year, and possibly another 95 per year for several years thereafter. The bulk of these trainees will be used to staff already approved FAO/World Bank-financed agricultural or rural development projects.

By 1980, if the team's proposals are followed, Yemen should be operating a Ministry of Agriculture staffed by more than 1,000 individuals possessing professional or semi-professional training of one level or another. This should provide the manpower base for institutionalization of many projects such as agricultural research, plant protection, animal husbandry, etc. which are now in their early test and training stages.

b. The Yemeni farmer's openness to innovation:

Since this is a subject which is under investigation by various anthropologists and sociologists now resident in the Yemen, anything said here is necessarily tentative and subject to major revision as detailed analysis is developed.

There are a number of crop introductions and technological changes which have occurred in the Yemen during the past ten years. These include such matters as: the introduction of the

diesel pump engine to hand-dug water wells for purposes of irrigation; potato production on an expanded scale using new varieties developed by German technical assistance; contract plowing by tractor in many parts of the Yemen; fertilizer use; plant protection spraying; and the introduction of foreign varieties of cantaloupe and watermelon.

In all of these, and other cases not cited, the Yemeni farmer has demonstrated a common-sense, shared, approach to change. If a thing works, he wants it; but he has to be convinced that it will be a profitable useage or product which can be relied upon. In this, the Yemen farmer appears to be no different from the peasant subsistence farmer everywhere. He has to be very careful about the degree of risk attached to a new technology or crop. Once there is some pragmatic evidence about the degree of risk, he will move quickly to adopt whatever is new.

Having said this, there are a number of factors which appear to condition Yemeni farmer capacities for change. These include:

- Poor natural resource endowments including low and erratic rainfall which causes severe shortage of agricultural water supply, and small per capita cultivable land area much of which is in fragmented and extensively terraced plots with little prospect for its expansion.

Only 2% of the entire area of the country is cultivated. The rest is either semi-arid grazing lands or mountains, lava, and sub-marginal soils. This means that approximately 2,900 square kilometers of the country, a very small area indeed, constitutes the cultivatable potential.

This limited area spreads over five agricultural zones where rainfall ranges from 50 mm. to 1,000 mm. per year. They include:

The Coastal Belt of the Tihamas: from sea level to 700 Meters altitude, with an annual rainfall of 150 mm. and below, where rainfed millet is the staple crop and irrigated cotton the main cash crop; cattle raising is also important.

The Western Slopes: - from 700 to 1000 Meters altitude, with 400 to 600 mm. annual rainfall, where sorghum is the staple crop and coffee the main cash crop.

The Central and Southern Uplands: including most of the Taiz and Ibb Governorates at altitudes between 800 and 2,500 Meters and with rainfall varying between 400 and 1,000 mm. Sorghum is the staple crop; coffee and qat the main cash crops.

The intermontaine Plains, above 2,000 Meters altitude, with 300 to 500 mm. annual rainfall, where sorghum, barley, and wheat are grown besides considerable sheep and goat husbandry.

The Eastern Slopes: 1,500 to 2,500 Meters altitude with marginal rainfall, where millet is the main crop, and camels are raised.

- Shortage of skilled manpower and effective institutions: -

As mentioned earlier, Yemen lacks an effective Ministry of Agriculture. There is no Agricultural Extension Service today, though at some point in the future there may well be one.

Central government institutional coverage of the country as well as control is limited. While government offices concerning finance, police, education, health, communications, and justice extend to all 41 Quada's of the country, this is not so at the next lower level among the 165 Mahyah's.

In some cases, such as the Northeastern and Southeastern reaches of the country, governmental authority is only marginally recognised by ruling Sheikh's.

Private institutional development, in the form of banks, trading companies, etc., while expanding, is based exclusively upon service to urban environments.

- A primitive level of social overhead infrastructures such as feeder roads, etc.

The length of surfaced roads in the entire country, exclusive of urban areas, is less than 1,000 kms.; and this network connects the principal cities only.

Of the 15,418 villages in country less than 10% are connected to the principal road net by improved gravel, earthen, or rock construction feeders. The great majority are linked only by tracks which are kept open through the use of local work and repair crews.

- The power structure inherent in a centuries-old tribal society and resulting land tenure arrangements.

There appears to be considerable differences of opinion about the nature and spread of land tenure arrangements in the Yemen. It is said, for example, that up to 90% of the farming is done on a share tenancy basis. Of this land, approximately 70% is owned by Sheikh's and merchants; and the other 20% is owned by religious foundations (Waqf land). The forms of rent or

lease agreement are individually negotiated on an annual basis and the conditions of lease are exceedingly variable and complex. Annual rents are often said to run as high as 65% of the harvested crop with the tenant also having to pay for any new inputs.

There are those who argue either that share tenancy is not so widespread or that, in any case, the conditions of tenure are seldom onerous. The northern highlands appear to be the areas where most authorities agree that share tenancy is less widespread. But for most of the other portions of the country, the western slopes and the Tihama's, there is general agreement that considerable levels (40% to 90%) of share tenancy exist.

Investigation of these matters is very difficult and may be dangerous. A number of foreign technical assistance agencies operating in the Yemen have concluded that the heavily armed countryside and the lack of effective police forces beyond major city boundaries are effective deterrents to display of curiosity about land tenure conditions in local situations.

c. Present or potential systems for dissemination of innovative technologies:

The Yemeni male, (to the extent that it is possible in an environment limited by transport routes and means of movement) is a mobile person. He is adventurous, curious, and hardy. His most immediate point of travel is the local souk (market) and beyond that to the location of his principal Sheikh. Next, he likes to get to the next largest village; and, in all cases, he is usually looking both for entertainment and profit. Entertainment often takes the form of buying and selling. He is a born merchant, and if not operating his own selling enterprise, he derives enjoyment from watching the selling activities of others. In this connections, when introducing fertilizer into the northern part of Yemen, the Germans discovered that the small local merchant network connected to village souks was an effective way to bring fertilizer to the attention of farmers. Particularly so when the sales were ranged on a flexible 'incentive price' scheme which allowed merchants to vary prices in some degree thereby abetting the Yemeni practice of looking for the best deal.

The Yemeni male is also gregarious. His afternoon 'qat' party, accompanied as it is by gossip, jokes, and serious discussion has traditionally performed the role of communication media in the western world. Through this means he is both informed and entertained. As the Germans discovered, when introducing new

varieties of potatoes, one of the prime sources of enquiries to them concerning where to obtain the varieties were those who first learned about these 'miracle' crops through hearing others tell about them at 'qat' parties.

Currently, use of the transistor radio is sweeping over Yemen. Almost every village has at least one, but the effects of their programming is not easily measured. There are some who say that various women's programs on the radio have been of great assistance already in acquainting the secluded Yemeni rural woman with modern trends in dress, cookery, etc. There are others who attribute credit for widespread villager understanding of what Local Development Associations do, to the radio programs which dramatize accomplishments in building schools, roads, and improving village water supplies.

While these and other systems not mentioned may not be adequate for demonstrating new technologies, they do have the potential for attracting interest among the rural Yemeni. What is yet required are means by which simple packages of technological inputs can be easily demonstrated at low cost by almost untrained personnel.

In summary, because this project involves basic staples in the everyday life of the Yemeni, there is a very high probability that the 'spread effect' potentials described here can result in a high degree of adoption IF it is proven satisfactorily to the farmer that the risks are minimal.

3. Social Consequences and Benefit Incidence:

This subject is treated from only two points of view: the rural poor of Yemen; and equity considerations.

a. Yemen's rural poor:

As a country, the Yemen Arab Republic is considered by the IBRD as one of the very least developed countries in the world. By this criteria it could be concluded that almost any developmental activity in Yemen will affect the poorest people. Moreover, while no accurate statistics exist regarding income distribution, simple observation indicates very little of the wide income disparities common to much of the developing world, especially in Latin America and the Asian sub-continent. Also, the contrast between the large masses of urban and rural residents is muted in the Yemen. There is a temptation to conclude that the great majority of all people are essentially equally poor.

But this is a fallacy. There are sections of the country which are far advanced over others economically simply because of natural resource endowments. The Governorates of Ibb and Taiz contain approximately 20 % of the population of the country. But they enjoy numerous advantages, especially more abundant rainfall.

Together, they produce more than 50% of all the potatoes, maize, and wheat within the Yemen and approximately 32% of all sorghum and millet production. They have more schools per thousand population than any other Governorates and their physician-medical assistant ratios per thousand population also exceed those of any other Governorates.

Yet, these matters are relative and particular. The enormous (comparative) productivity does not mean, necessarily, that all areas within these two Governorates are far advanced and wealthy. There are numerous 'pockets' within those Governorates which compare to conditions in the Governorates of Sana, Hajja, Sada, Beida, and elsewhere. But on the whole, both Taiz and Ibb are better off than all other places in the Yemen.

Others, however, have some advantages though they may not be so great as those of Taiz and Ibb. The two Governorates of Sana and Al-Hodeidah contain 30% of the total population and produce approximately 45% of the sorghum-millet crop for the country.

Some Governorates appear highly disadvantaged on all counts. These include Hajja, Sada, Mareb, and Al-Beida. All contain large portions which have 200 mm. or less zones of rainfall. All are still dominated by tribal structures of authority to a greater degree than other parts of the country. Basic social overhead infrastructure, especially roads, communication, schools, etc. are less well developed. As a group, they contain approximately 15% of the population of the country.

Considering these varying conditions, it is of interest to observe that the proposed sorghum-millet project is aimed, primarily, at developing those varieties that will be high-yielding under dry conditions. In theory, at least, this would indicate that the benefit/incidence would skew in favor of the more disadvantaged areas containing large populations with dryer conditions such as Sana and Al-Hodeidah or those with small populations and still dryer conditions such as Hajja, Mareb, Sada, and Al-Beida.

On the other hand, some of the varieties developed will also be high performers in wetter regions such as Taiz and Ibb. In such cases, since those areas also produce wheat and maize it is likely that hectareage released by increased sorghum-millet yields will be shifted to expanded wheat and maize production as well as to horticultural crops in some areas. Just how this will affect comparative regional benefit/incidence is a matter requiring accumulation of economic data.

b. Equity considerations:

Given the general lack of reliable data it is difficult to sort out equity issues and potentials related to this project. It is possible, however, to look at the matter in general terms related to the following items:

- Access to resources and opportunities:

Basically, this is a varietal improvement project aimed at working within the context of traditional agricultural practices of Yemen. Though new technological practices in cultivation may be developed in order to further increase yield potentials they are not essential to success in the first instance. Thus, if this project can succeed in moving seeds to farmers the technology required will be neutral. The one variable, here, will arise out of the degree to which the variety has been thoroughly field tested to local conditions and does not, therefore, carry high-risk potentials when used.

If the latter can be achieved, then small farmer reluctance to participate from the outset can be overcome automatically. This is particularly important in the Yemeni context since it appears that land tenancy may be a major factor operational almost everywhere. This is further complicated by the possibility that, as alleged by some observers, tenants are forced to pay for the costs of new inputs. Such inputs, therefore, must be low in cost and low in risk potential.

It should be stressed, however, that by concentrating efforts on drier areas the use of fertilizer inputs will be minimized considerably. While small per hectare incremental use may be beneficial we do not anticipate that large quantities will be necessary on a hectare basis. This factor will be most important to small farmers.

Just how the varieties are to be disseminated, once they are field-tested in depth, has not yet been determined though it is clear that, ultimately, there will be reliance upon a private seed market. It is probable that, in the initial stages, if dissemination is tried through other projects addressed to disadvantaged areas such as a possible rural development program then some measure of equity will be introduced. But, on balance, it is more than probable that larger farmers with easier access to sources of seed distribution will have the initial advantage.

- Employment:

Increased yields of these crops will generally not decrease or displace employment. In fact, it is more than probable that higher yields will cause greater problems for what appears to be an already rural labor deficient market in many areas. In part, these can be met - as remarked earlier - by the introduction and use of threshing and other machinery.

On the other hand, acute rural labor shortages do not seem so evident in the more arid portions of the country. This may be because current yields are low. Such areas are also inhabited by more conservative populaces who tend to stay with their villages as long as possible; but supplement their incomes through working in nearby towns or cities on a part-time basis.

If such is truly the case in the more arid areas then it is possible that the successful introduction of higher yielding varieties of sorghum and millet might cause rising rural employment and some displacement of employment from towns back to rural areas.

The one labor group vitally affected, in any case, will be the women. They are, increasingly, the mainstay in all agricultural operations in the Yemen. They are performing far more of the tasks traditionally associated with men, and there is growing evidence which indicates that as they obtain remuneration for their services women are investing in vegetable gardens, goats, sheep and other family enterprises on an increasing scale. The whole subject, of course, demands much careful observation in future.

In summary, given careful development of the varieties with an eye to serving the more arid zones effectively and the establishment of a dissemination system designed to favor the small farmer (if possible) it is probable that this project could exert a positive influence upon the less disadvantaged regions of the country.

D. Economic Analysis:

Today, Yemen produces annual crops of sorghum and millet valued at internal market prices of \$85,245,952. None of these crops are exported. They are consumed in country and, as reported elsewhere in this document, constitute a major part of the daily diet of rural Yemeni families. They are also a large element in animal diet from the standpoint of stover (fodder) utilization.

When these crops fail or suffer great reduction as the result of droughts in 1972 and 1973 the economic effects upon rural Yemen are enormous.

In terms of human consumption, the crop shortfalls of those years severely affected levels of nutritional intake per family and necessitated importation of foreign cereal grains. The nutritional deficits are impossible to calculate. Food imports in those years moved upwards by \$5,000,000 largely because of need to make good on sorghum and millet shortfalls.

Similarly, the effects of sorghum production shortfalls on the cattle population of the Yemen is not easy to calculate. K.A. Ross of the FAO calculates that about 20% of the indigenous cattle population of 1,000,000 was lost during the dry years. Since a large portion of this population is used to draw plows and other cultivation equipment, as well as haul produce, it is impossible to calculate what the effects of such a large drop in animal power capacity had on rural Yemen. Just in animal prices alone, the loss has been estimated at \$35,000,000.

While sorghum/millet do not constitute the most highly valued crops per ton produced in the Yemen, they comprise the single largest money-valued crops.

But there is a great deal which is unknown about the economics of their production, marketing, and consumption. There are no data showing how much it costs to produce a metric ton of sorghum under varying conditions of tenancy, size of holdings, size of family labor force, and location in relation to markets, soils, rainfall, and climatic conditions. Similarly, little is known about the amounts of grain that are commonly held in family storage, storage practices, and the value of grain lost through poor threshing and storage techniques. Nor is there any data showing internal trade flows of sorghum/millet among various regions of the country.

Given these circumstances, it is impossible to provide the kind of economic analysis that is commonly required for a project of this kind. Nor is it possible to assert that current government

statistical-gathering systems now under development and installation can be expected to provide useful data in future. Present taxation practices cause farmers to consistently under-value all production.

In this situation, as will be noted in the section of Evaluation, the project will seek to encourage farm-gate data-gathering both in the field testing period and when dissemination begins. Part of the TDY assistance requested under the INPUTS section of this PP will be devoted to developing the methodology for setting up simple farm management studies to be carried out by the project. Related projects, such as the possible one on rural development, will contain a field research and data-gathering emphasis in order to obtain some of the farm economic data which is not now available.

Hopefully, at the end of five years experience in the project, enough data relevant to these specific crops will have been developed to permit exercise of sound judgement about the proportions and character of further future assistance.

Part IV Implementation Arrangements

A. Analysis of the Recipient's and AID's Administrative Arrangements:

1. Recipient:

a. Key Organizations for Implementation:

The principal YARC agency for policy control and coordination on this project will be the Central Planning Organization. (CPO) The project will be executed by the Ministry of Agriculture. That Ministry is described in the attached Annex 3 - Organizational Chart. Within that Ministry, the Director-General of Agricultural Services will be directly responsible for this project.

Because the Ministry is very small and now undergoing intensive staff training and expansion, the Project will have a distinct organization complete with it's own staff. This will be an integral part of the Ministry, but the project will be supervised and implemented on a semi-independent basis in which the Ministry and USAID will jointly meet supervisory, logistic, staffing, and other requirements. Yemeni personnel attached to the project will be Ministry employees. The proposed layout is described in the attached Annex 4.

Such an arrangement will have the following advantages:

- It will free Ministry personnel and administrative systems of daily responsibility for detailed management of each step of the project.

- It will enable project personnel to carry on coordination activities with other elements of the Directorate, including Agricultural Extension Training, Field Crops and State Farms, and Plant Protection. Similarly, it will be possible to work with other important elements in the Ministry such as Planning, and Finance and Administration.
- As other USAID-assisted agricultural related projects come on stream, (poultry, rural development and possibly horticulture) this arrangement will facilitate coordination and mutual support between these various projects.
- The development of this Yemeni staff and research approach will complement the various research-oriented programs of other foreign donors and, ultimately, lead to the creation of an agricultural research establishment within or attached to the Ministry of Agriculture.

b. The role of the Ministry of Agriculture:

Basically, the Ministry will stand as sponsor and co-financing agent within the YARG for this project. It will have to select and assign the Yemeni staff required and see to their compensation. Similarly, it will have to obtain the necessary research station lands in appropriate locations and equip them with the necessary structures, etc. Furthermore, it will have to sponsor the coordination of this effort within the YARG, including the various elements of the Ministry.

As field testing begins, and related economic research activities, the Ministry will have to see that these efforts are coordinated with those of other donors and various points of joint cooperation established.

2. A.I.D.:

a. Key Organizations for Implementation:

Within the USAID Mission structure, the Food and Agriculture Office will be responsible for the organization, supervision, coordination, and evaluation of this project.

It is expected that this Office will see to it that all necessary coordination is achieved, within the Mission, with related projects sponsored by USAID; and that, similarly, coordination is fostered with all other agriculture-related foreign donor projects.

Implementation of the project will be the responsibility of a contracted outside agency with research capacity. This contractor will be supervised by the USAID Food and Agriculture Office working in close collaboration with the YARG Ministry of Agriculture.

Among possible contractors the following are only representative: The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the U.S. Department of Agriculture (USDA), or one of several U.S. and land Grant universities or a consortium of universities.

Our first choice would be ICRISAT because their specific research interests are concentrated on sorghum, millet, and edible legumes which are grown in semi-arid areas. Also they specialize in farming systems keyed to moisture conservation. The second choice would be a Southwestern University or a university group with experience in these crops under dry land and irrigated conditions. The third choice would be USDA.

~~The contractor chosen would provide senior level personnel plus TDY assistance as required and would have the research linkages necessary for successful project implementation.~~ Their efforts would be assisted by International Voluntary Services or Peace Corps volunteers, under contract to USAID, who would work under the technical direction of the two senior-level research scientists.

b. The role of the participating organizations :

As indicated above, the USAID Food and Agriculture Office would be responsible for all but the implementation of the project. This includes insuring provision of appropriate YARG staff to the project; site selection and development; selection of YARG staff for training; abroad; logistic back-up etc. All other offices of USAID will provide the necessary back-up for each requirement imposed upon the Office of Food and Agriculture when carrying out this overall responsibility.

Similarly, the Ministry of Agriculture of YARG will exercise coordinate responsibility with the USAID Food and Agriculture Office in carrying out all appropriate support, coordination, selection, logistic functions necessary for effective project implementation.

Finally, the contractor will work within the operational framework and guidance as provided by the USAID Food and Agriculture Office.

All participating agencies will cooperate in the necessary data-gathering and evaluation activities required in this project.

B. Implementation Plan: See Annex 5

C. Evaluation Arrangements for the Project:

Because this project is addressed to the introduction of new technological inputs (improved varieties and, where appropriate, new cultivation practices) and the creation of conditions leading to institutionalization of cereals grain research in the Yemen; it will be the object of some special evaluative activities including:

1. The training of selected CPO and Ministry of Agriculture staff in USAID's evaluation system (logical framework analysis), USAID staff, and contractor staff. This training, if at all possible, will take place sometime in the first twelve months after the project is fully operational. It will require one week at Sana and will be provided by a special contractor employed by USAID and selected with the assistance of AID/W.
2. The development of farm budget baseline data concerning the production of sorghum and millet in a number of differing conditions. How this data is to be gathered will be the object of continuing attention of the USAID Food and Agriculture Office. Data-gathering will begin in the very early stages of the project and be programmed as a continuing input to the project.
3. The project will receive the annual PAR evaluation by Mission personnel in cooperation with the ALAD program, the contractor, Ministry of Agriculture and CPO personnel.
4. Sometime during the third year after the project has become fully operational it will be subjected to an in-depth outside evaluation. That evaluation will look at a number of matters usually not treated in annual reviews. These will include:

- a. Examination of the project in the perspective of overall cereal grain production, consumption, and importation levels and practices at that time in the Yemen.
- b. Examination of the general cereals research efforts of other foreign donor agencies and an assessment of those efforts vis-a-vis the USAID-assisted project.
- c. Review of the data-gathering activities carried on in the project and an assessment of content as well as suggested ways to improve data-gathering.
- d. Review of how the project has been coordinated with other USAID projects and among YARG agencies together with suggested improvements.
- e. Study of the extent to which the project is or will contribute to institutionalization of sorghum/millet research within the YARG; and suggested improvements or revisions in the project in order to better achieve that objective.
- f. Technical analysis of the experience earned in the project, with suggested policy improvement changes.
- g. Extent to which the project has contributed to, and is expected to continue to contribute to, the YARG 3 year plan for agriculture.

Personnel for such an intensive and wide-ranging review, of at least one month's duration, should include a skilled scientist from ICRISAT, a specialist on institution-building, an AID/W representative, the annual PAR review team members at Sana and possible others including a representative from ALAD.

D. Conditions, Covenants and Negotiating Status:

This Project is in effect an extension and expansion of Project 018, Sorghum Production. There are no conditions precedent required prior to initial disbursement and the status of discussions with the Ministry of Agriculture and the Central Planning Organization as to their inputs has been finalized. They have agreed to pay salaries of all counterparts assigned to the Project, as well as continue salaries of those undergoing training abroad, furnish land for the major and sub-stations, assist in obtaining cooperators for off-station testing, provide assistance in the clearing of commodities thru customs and pay for internal transportation of the commodities, provide personnel suitable for training in the US or third countries and insure that they return to the Project or the Ministry of Agriculture, and assist in the evaluation at the end of three years. The ProAg Project description will be a summary of the main thrust of the Project Paper including progress to date under 018 and the desired achievements under this Project.

Logical Framework

I. A. Program or Sector Goal:

Lower farmer risks for the expansion and intensification of sorghum and millet production nationwide so that agricultural growth is facilitated through:

1. Increased crop diversification.
2. Increased net farm income.
3. Improved nutritional levels.
4. Operation of effective agricultural research institutions.

B. Measures of Goal Achievement:

1. Greater quantity and variety of foodstuffs produced and offered for sale.
2. Expanded domestic storage of sorghum and millet production.
3. Improved rural incomes.
4. Yemeni staff trained in research methodologies and research systems management.

C. Means of Verification:

1. Spot survey and observation indicating greater economic activity in local areas.
2. Spot survey and observation of both farmers' fields and markets indicating greater quantity and variety of local foodstuffs.
3. Sample survey data showing millet and sorghum domestic storage trends.
4. Numbers and kinds of research training provided for Yemeni members of the Ministry of Agriculture.

D. Important Assumptions:

1. Overall YARG economic policies will be conducive to agricultural growth.
2. Growing political and economic stability within the country and region.
3. Farm risks can really be lowered for the production of sorghum and millet in drier areas of the country.
4. There is a connection between expanded sorghum and millet production and increased crop diversification.
5. The YARG will gradually develop a national agricultural research institution capacity.

II. A. Project Purpose:

Establish a national coordinated sorghum/millet crop improvement program.

B. End-of-Project Status:

1. Varieties of sorghum and millet identified, field tested, and distributed under local conditions particularly oriented to semi-arid and low rainfall conditions.
2. Coordinated donor-assistance efforts facilitating local test and distribution of high-yielding varieties of sorghum and millet.
3. Related cropping practices developed and under test in local areas.
4. Yemeni trained in research institutional management; and considered means by which agricultural research might be institutionalized within the Yemen.

C. Indicators:

1. National Sorghum and millet production increased for the country as a whole.
2. Sorghum and millet production increasing in some semi-arid areas.
3. Trials taking place on other donor test areas and tested varieties under distribution within other donor project areas.
4. Increased crop diversification taking place.
5. Yemeni policy-makers using agricultural research findings when making decisions on sorghum-millet matters.

D. Targets:

1. A 3 percent increase in national sorghum and millet production.
2. A 10 percent increase in sorghum and millet production in particular semi-arid areas.
3. FAO and FRG test farms collaborating with the sorghum and millet program; and FRG-supported plant protection service monitoring the areas where new varieties are being introduced in donor projects.
4. Yemeni expansion of requests and authorizations for research training, and research program staffing by Yemen personnel.

E. Means of Verification:

1. Analysis of the CPO's annual statistics on national sorghum and millet production.
2. Base-line surveys early in the project of three carefully chosen semi-arid areas probably of Qadr size in order to get a "fix" on approximate production levels of sorghum and millet. Follow-up surveys to take place as varieties are tested and distributed in those areas.
3. Review with FAO and FRG personnel periodically.
4. Analysis of the CPO's annual national statistics accompanied by spot surveys.

5. Review of requests and staffing authorizations on this subject with Yemeni Authorities as well as donor organizations.

F. Important Assumptions:

1. The YARG will continue to assign high priority to improved production in sorghum and millet.
2. A prolonged drought of the type encountered from 1969 to 1973 will not take place during the life of the project.
3. Other donor agencies will continue to remain interested in collaboration with USAID and the YARG on this activity.
4. USAID and the contractors involved will provide timely, effective and high-quality professional support to this project at all times

III. A. Outputs:

1. A research station network for sorghum-millet research established, equipped, and operational.
2. Yemeni staff trained in sorghum-millet research and research management either assigned to such work functioning or in varying stages of training prior to such assignments.
3. Varietal trials scheduled and operational annually.
4. Cultural practices trials scheduled and operational annually.
5. Rotational cropping trials scheduled annually.
6. Off-station field trials scheduled annually.
7. Local distribution and test trials scheduled with other USAID projects and donor projects annually.

B. Targets:

1. Completion and operation of main research station within first two years of project.
2. Completion and operation of first sub-station research center by end of third year of project.
3. Completion and operation of second sub-station research center by end of fourth year of project.
4. Ten varietal trials on sorghum and five on millet per year.
5. Eight cultural practices trials on (4) above per year, starting in second year.
6. Four off-station field trials scheduled in the first year.
Six off-station field trials scheduled in the second year.
Eight off-station field trials scheduled in the third year.
Ten off-station field trials scheduled every year thereafter.
7. One FAO, USAID, and other donor project area added to test and distribution program per year.
8. Yemeni staff trained and assigned to sorghum-millet program at doubling rate annually starting with three in the first year.

C. Means of Verification:

1. USAID-maintained project records.
2. Contractor-maintained records.
3. Ministry of Agriculture records.

D. Important Assumptions:

1. Prompt and constant assignment of staff by YARG.
2. Availability of qualified candidates for training.
3. Provision of necessary research station lands by YARG.
4. Timely recruitment of U.S.-provided contractual staff.
5. Rapid delivery of necessary U.S. commodities.
6. Early availability of YARG candidates for training and appropriate locating of best training institutions.

IV. INPUTS

A. U.S.:

Technicians	\$ 1,225,000
Participant training (\$417,000)	456,000
Other Costs (\$767,000)	767,000
Commodities (\$259,000)	259,000
TOTAL -	<hr/>
	\$ 2,707,000

B. YARG:

Salaries (\$852,000)	\$ 852,000
Land for two Sub-stations (<u>value to be determined</u>)	
TOTAL -	

C. MEANS OF VERIFICATION:

Expenditure Records

D. ASSUMPTIONS:

None.

*Does not include 018 carry-over.

ANNEX 2
BUDGET TABLES
INPUTS

U.S. Technicians

	FY76	INT	FY77	FY78	FY79	FY80	FY81	TOTAL
Coordinator								
MMF	18	3	12	12	12	3	-	60
MMOB	9	3	12	12	12	12	-	60
\$ 000	75	13	53	55	58	46	-	300
Agronomist								
MMF	18	3	12	12	12	3	-	60
MMOB	9	3	12	12	12	12	-	60
\$ 000	75	13	53	55	58	46	-	300
Seed Production (TDY)								
MMF	-	3	3	3	2	1	-	12
MMOB	-	3	3	3	2	1	-	12
\$ 000	-	16	16	16	12	8	-	68
Plant Protection (TDY)								
MMF	-	-	6	6	3	3	-	18
MMOB	-	-	6	6	3	3	-	18
\$ 000	-	-	28	28	16	16	-	88
Other TDY								
MMF	3	-	3	3	3	3	-	15
MMOB	3	-	3	3	3	3	-	15
\$ 000	16	-	16	16	16	16	-	80
IVS Agronomist (1)								
MMF	18	3	12	12	12	6	-	63
MMOB	9	3	12	12	12	12	-	60
\$ 000	24	9	20	22	24	20	-	119
IVS Agronomist (2)								
MMF	18	-	12	12	12	6	-	60
MMOB	6	3	12	12	12	12	3	60
\$ 000	24	-	20	22	24	-	-	90
IVS Agronomist (3)								
MMF	18	-	12	12	12	6	-	60
MMOB	3	3	12	12	12	12	6	60
\$ 000	24	-	20	22	24	-	-	90
IVS Farm Equipment								
MMF	18	3	12	12	12	3	-	60
MMOB	9	3	12	12	12	12	-	60
\$ 000	24	-	20	22	24	-	-	90
TOTAL MMF								
	111	15	84	84	80	34	-	408
TOTAL MMOB								
	48	21	84	84	68	79	9	393
\$ 000								
	262	51	246	258	256	152	-	1225

Cost Factors: Contract - 50,000/year with approx. 5% annual inflation, TDY \$8,000 1st month, \$4,000 ea. additional month, IVS \$16,000/year with approx. 10% annual inflation.

Participants		FY76	INT	FY77	FY78	FY79	FY80	FY81	Total
Coordinator	MMF	12	12	12	12	12	-	-	60
(MS degree)	MMT	-	3	12	12	12	12	9	60
	\$ 000	12	12	12	12	12	-	-	60
Sorgh. Breeder	MMF	7*	-	12	12	12	12	-	55
(BS degree)	MMT	4	3	12	12	12	12	-	55
	\$ 000	7	-	12	12	12	12	-	55
Millet Breeder	MMF	7*	-	12	12	12	12	-	55
(BS degree)	MMT	4	3	12	12	12	12	-	55
	\$ 000	7	-	12	12	12	12	-	55
Sub-Station #1 • Tihama	MMF	-	7	7*	7*	-	-	-	21
	MMT	4	3	7	7	-	-	-	21
	\$ 000	7	-	7	7	-	-	-	21
Sub-Station #2	MMF	-	-	7*	7*	-	-	-	14
	MMT	-	-	7	7	-	-	-	14
	\$ 000	-	-	7	7	-	-	-	14
Agronomist	MMF	7*	-	7*	12	12	-	-	38
	MMT	4	3	7	-	12	12	-	38
	\$ 000	7	-	7	12	12	-	-	38
Extension	MMF	7*	-	7*	12	12	-	-	38
	MMT	4	3	7	-	12	12	-	38
	\$ 000	7	-	7	12	12	-	-	38

Participants (cont'd)

		FY76	INT	FY77	FY78	FY79	FY80	FY81	Total
Seed Product.	MMF	12	7	-	7*	12			38
	MMT	9	3	7	7*	-	12	-	38
	\$ 000	12	7	-	7	12	-	-	38
Seed Control	MMF	12	-	-	-	-	-	-	12
	MMT	9	3	-	-	-	-	-	12
	\$ 000	12	-	-	-	-	-	-	12
Pathologist	MMF	-	12	-	-	12	12	-	36
	MMT	-	3	9	-	6	12	6	36
	\$ 000	-	12	-	-	12	12	-	36
Entomologist	MMF	-	12	-	-	12	12	-	36
	MMT	-	3	9	-	6	12	6	36
	\$ 000	-	12	-	-	12	12	-	36
Station Mgr.	MMF	7*	-	7*	-	-	-	-	14
	MMT	4	3	7	-	-	-	-	14
	\$ 000	7	-	7	-	-	-	-	14
TOTAL:	MMF	78	43	71	81	96	48	-	417
	MMT	42	33	96	57	72	96	21	417
	\$ 000	78	43	71	81	96	48	-	417
	(\$ 000)	(78)	(45)	(80)	(83)	(110)	(60)		(456)

* = ALAD Training; all other training assumed to be costing \$1000 per month with no inflation factor.

(1) Includes approximately 5% inflation per year.

Commodities <u>1/</u> , <u>2/</u>	FY76	INT	FY77	FY78	FY79	FY80	FY81	Total
Tractors*	25	-	-	-	-	-	-	25
Tillage Equipment*	15	-	-	-	-	-	-	15
Wagons (2)	3	-	-	-	-	-	-	3
Levelling Equipment*	1	-	-	-	-	-	-	1
Planting Equipment*	2	-	-	-	-	-	-	2
Harvesting Equipment*	6	-	-	-	-	-	-	6
Misc.Tools/Equipment*	10	43	4	3	2	2	-	66
Vehicles Blazers (4)	28	-	-	-	-	-	-	28
1.5-ton Truck (1)	10	-	-	-	-	-	-	10
Seeds/Fert./Pesticide	8	40	8	9	10	10	-	85
Visual Aids	2	5	2	3	2	2	-	16
TOTAL \$ 000	110	92	14	15	14	14	-	259

1/ Includes transportation costs, plus approximately 10% inflation per year.

* Tractors - one 65-HP diesel and one 45-HP diesel.

Tillage Equipment - includes 2 moldboard plows, 2 disc plows, 2 harrows, and 2 tool bars with shovels for the above tractors.

Levelling Equipment - includes one land leveller and one backfill blade for the 65-HP tractor.

Planting Equipment - includes 2 seed drills and 2 planters (tractor-mounted).

Harvesting Equipment - includes 4 small-head threshers, 3 plot threshers, 3 seed cleaners, and one large thresher.

Misc. Tools - includes 3 self-propelled rototillers for station work, one tractor-mounted ditcher, one tractor-mounted fertiliser (rotary) spreader.

2/ Due to lack of price catalogs in some cases these figures are crude estimates.

OTHER COSTS \$ 000

	FY76	INT	FY77	FY78	FY79	FY80	Total
Pumps @ \$15,000 ea.	75	20	-	-	-	-	95
Engines @ \$15,000 ea.	75	20	-	-	-	-	95
Drilling Wells	200	51	-	-	-	-	251
Fencing (Sana)	30	-	-	-	-	-	30
Sana Office	20	-	-	-	-	-	20
Machine Shed, Sana	20	-	-	-	-	-	20
Utility 8 x 10, Sana	20	-	-	-	-	-	20
Seed and Fertilizer, Sana	5	-	-	-	-	-	5
Buildings, Sub-Station:							(See next 2 lines)
Seeds, Fertilizer (2)	15	-	-	-	-	-	15
Utility 8 x 3 (2)	60	-	-	-	-	-	60
2000 m. Irrigation Pipe	6	-	-	-	-	-	6
Cement, etc.	5	-	13	5	12	12	45
Salary Incentive	3	1	3	3	3	3	16
Seed Storage Equipment	3	-	2	2	-	-	7
Boxes	(1.5)	-	(1.5)	(1.5)	-	-	-
Shelves	(1.0)	-	-	-	-	-	-
Bottles	(0.2)	-	(0.2)	(0.2)	-	-	-
Misc.	(0.3)	-	(0.3)	(0.3)	-	-	-
Office Equipment	15	5	-	-	-	-	20
Misc./Inflation	48	-	2	2	5	5	62
TOTAL \$ 000	600	97	20	10	20	20	767

(1) Assumes main station plus two sub-stations.

YEMEN ARAB REPUBLIC

ANNEX 2

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Project Running Costs (\$ U.S. 000)

Salaries	FY76	INT	FY77	FY78	FY79	FY80	Total
Coordinator (1)	4	1	4	4	4	4	21
Plant Breeders (5) (2 each in sorghum, millet, and 1 general breeder/agronomists)	18	5	18	18	18	18	95
Station Manager (1)	3	1	3	3	3	3	16
Agronomist (1)	3	1	3	3	3	3	16
Extension (1)	3	1	3	3	3	3	16
Seedman (2)	6	2	6	6	6	6	32
Pathologist (1)	3	1	3	3	3	3	16
Entomologist (1)	3	1	3	3	3	3	16
Clerical and Financial (5)	8	2	3	8	8	8	42
Drivers/Mechanics (6)	7	2	7	7	7	7	37
Watchmen (5)	5	1	5	5	5	5	26
Payroll Costs (10%)	6	2	6	6	6	7	33
Per Diem (10%)	7	2	7	7	7	7	37
Inflation (5%)	-	2	8	8	8	8	34
O/M and Replacement of Equipmt*	44	11	44	44	44	44	231
Facilities Maintenance**	35	9	35	35	35	35	184
TOTAL U.S.\$ 000	155	44	163	163	163	164	852

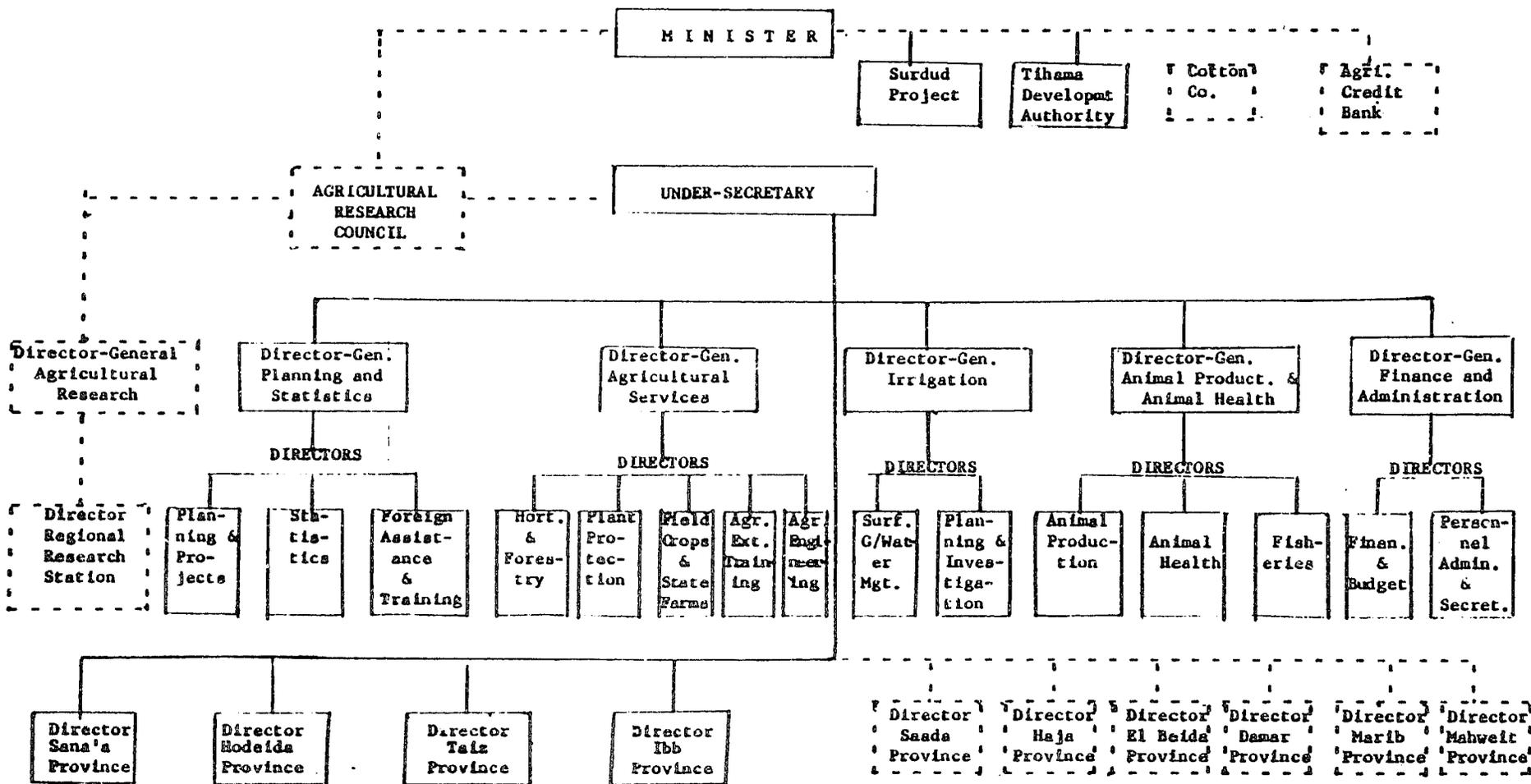
* Operation, maintenance and replacement of equipment estimated at 40% of original acquisition cost \$111,000.

**Maintenance of facilities estimated at 5% of original cost of \$696,000.

In addition to the above, the YARG has made available 10 hectares of land for the central research station at Bir Al Gahoum plus additional land for two sub-stations. The value of the land in Sana is estimated to be in excess of \$200,000.

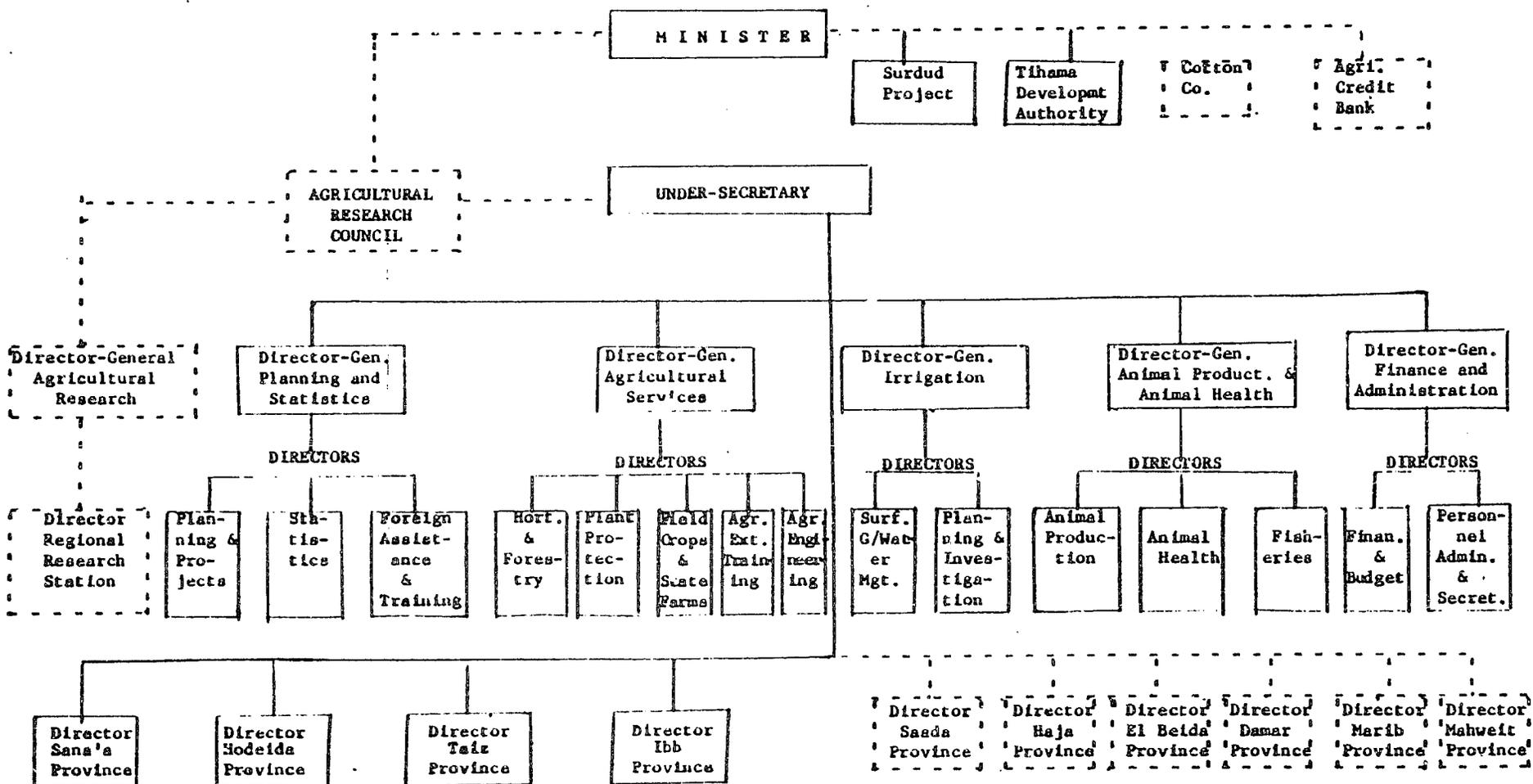
ANNEX 3

ORGANIZATIONAL CHART MINISTRY OF AGRICULTURE



ANNEX 3

ORGANIZATIONAL CHART MINISTRY OF AGRICULTURE





Department of State

TELEGRAM

Annex 6

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20
ORIGIN AID-66

INFO OCT-01 EB-07 L-02 NEA-09 /075 R

DRAFTED BY NEJA/TECH/SPP:ICANTHOLT:BW
APPROVED BY AA/NESA:ADWHITE
NEJA/SA:GLAUDATO (DRAFT)
NEJA/GC:JBURGESS (DRAFT)
PPC/DPRE:RBOBEL (DRAFT)
NEJA/CD:HSLUSSER (DRAFT)
TA/AGR:GBAIRD (DRAFT)
NEJA/TECH/SPP:JJDALTON (DRAFT)

DESIRED DISTRIBUTION

ACTION NESA INFO AATA GCNESA IDC GC GCFLD OLAB AGRIC COM LAB CHRON
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R 280037Z MAR 75
FM SECSTATE WASHDC
TO AMEMBASSY SANA

UNCLAS STATE 070239

AIDAC

E.O. 11652:N/A

TAGS:

SUBJECT: NATIONAL SORGHUM AND MILLET CROP IMPROVEMENT
PROJECT

REF: (A) PRP, (B) SANA 2549

1. BUREAU MET TO REVIEW PRP ON MARCH 11. CONSENSUS WAS
THAT MISSION SHOULD PROCEED WITH DEVELOPMENT OF THE PROJECT
PAPER. THERE ARE A NUMBER OF ISSUES AND SUGGESTIONS THAT
WE WANT TO PASS ON FOR YOUR CONSIDERATION AND USE IN
DEVELOPMENT OF THE PP.

2. PROJECT DESIGN: GIVEN THE MANPOWER AND INFRASTRUCTURE



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BASE THAT YEMEN HAS, IS THE PROJECT PURPOSE AND END OF PROJECT STATUS REALISTICALLY ACHIEVABLE IN THE PROJECT TIME FRAME? ALSO BEARING ON THE PROJECT PURPOSE AND EOPS IS THE QUESTION OF HOW THE YEMENIS VIEW THE PURPOSE OF THIS PROJECT. WE FEEL IT IS IMPORTANT FOR THIS KIND OF PROJECT TO KEEP THE PURPOSE STATED AS A TARGET, HOWEVER, IT MAY NOT BE A REALISTIC TARGET AT THIS TIME. IT WOULD BE BETTER TO ELEVATE THE PURPOSE AS STATED TO A SUB-ELEMENT OF THE GOAL STATEMENT IN THAT OUTPUTS BEYOND THOSE FORESEEN WILL BE NEEDED TO ACHIEVE THIS OBJECTIVE. AN ALTERNATIVE ACHIEVABLE PURPOSE MIGHT BE SOMETHING LIKE "IMPROVED VARIETIES AND

CROPPING PRACTICES IDENTIFIED, RELEASED, ETC." WITH, OF COURSE, THE SAME GOAL STATEMENT.

3. TIME SPAN: WHAT IS THE RATIONALE FOR SELECTING FIVE YEARS FOR THE LENGTH OF THE PROJECT? WOULD THREE YEARS OR SOME OTHER PERIOD OF TIME BE A MORE APPROPRIATE TIME FRAME FOR ACHIEVING PROJECT OUTPUTS? INCIDENTALLY, AID/W DOES NOT OBJECT TO THE 20-25 YEAR PROSPECTUS THAT DR. HOUSE SUGGESTED NEEDED TO BE KEPT IN MIND. WE BELIEVE THIS SORT OF REALISM PROVIDES FOR SOUNDER PROJECT DESIGN AND DEVELOPMENT.

4. PRIORITY AND RELEVANCE: WE ACCEPT THE IMPORTANT RELATIONSHIP BETWEEN DOMESTIC PRODUCTION OF FOOD GRAINS AND FX EXPENDITURES IN YEMEN BUT SEE NO NEED TO ADDRESS SUCH IN THE CONTEXT OF THIS PROJECT. IF THIS WERE THE PRIME CONSIDERATION WE NOTE FROM THE NATURE OF CEREAL IMPORTS THAT THE IMPLICATIONS FOR PROJECT ASSISTANCE MIGHT BE QUITE DIFFERENT, E.G., A WHEAT PRODUCTION PROGRAM. WE ARE AWARE OF THE OVERWHELMING IMPORTANCE OF SORGHUM AND MILLET TO YEMEN AND SUGGEST THAT THIS BE EXPANDED ON IN THE PP.

5. EQUITY: WE RECOGNIZE THAT INCOME DISTRIBUTION IN YEMEN MAY BE VERY MUCH SKEWED TOWARD THE UPPER-INCOME LEVELS AND THAT THE STRUCTURE OF THE SOCIETY MAY BE SUCH THAT INCREASING THE PRODUCTIVITY OF SORGHUM AND MILLET COULD, IN FACT EXACERBATE THE EQUITY SITUATION IN YEMEN. THE 1973 IBRD REPORT STATES THAT SOMETHING LIKE 90 PERCENT

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OF THE CULTIVATED ACREAGE IS FARMED BY TENANTS WHO PAY ONE-HALF TO TWO-THIRDS OF THE TOTAL PRODUCTION TO THE LANDOWNERS DEPENDING ON WHETHER THE LAND IS UNIRRIGATED OR IRRIGATED. THE IMPLICATIONS THIS PROJECT HAS FOR EQUITY ARE LIKELY TO BE RATHER DIFFICULT FOR MISSION TO ASSESS GIVEN THE PRIMITIVE NATURE OF DATA AVAILABLE IN YEMEN, AND THE LIMITED STAFF AVAILABLE TO FOCUS ON THIS ISSUE. AID/W WOULD PROPOSE THAT AS PART OF THIS PROJECT CERTAIN STUDIES BE UNDERTAKEN WITHIN FIRST YEAR TO 18 MONTHS SIMILAR TO THOSE STUDIES OUTLINED IN REF. B, PARA 2 SUB-PARA E AND F AND ANY OTHERS THAT APPEAR TO BE RELEVANT AS PROJECT PAPER IS DEVELOPED. SCOPES OF WORK FOR INTENDED STUDIES SHOULD BE INDICATED IN PP. AID/W WOULD OFFER HELP AND GUIDANCE IN DRAFTING SCOPES EITHER FROM WASHINGTON OR BY TOY TEAM IF MISSION DECIDES IT SO NEEDS. AID/W GENERALLY FEELS THAT THIS PROJECT SHOULD BE SUPPORTED BECAUSE OF THE DIRECT PHYSICAL RELATIONSHIP BETWEEN WELFARE LEVELS AND THE ACTIVITY AREA THE PROJECT INTENDS TO SUPPORT.

6. MANPOWER: THE IMPLICATIONS THAT ANY PROJECT HAS FOR REQUIRING SCARCE MANPOWER TALENT IN YEMEN IS OF CONCERN TO US AS WE KNOW IT IS TO THE MISSION. WE DO NOT OFFER ANY SPECIFIC SUGGESTIONS IN THIS AREA EXCEPT THAT THE DEVELOPING OF THE DEVELOPMENT OF THE PP SHOULD BE A USEFUL VEHICLE TO CONTINUE TO IMPRESS YARG OFFICIALS WITH THE PRIORITY OF THIS SUB-SECTOR AND THAT PLANNING ON THEIR PART FOR ALLOCATION OF MANPOWER TO THE PROJECT NEEDS TO BEGIN EARLY ON. WE ENCOURAGE AS CANDID AN ASSESSMENT OF MANPOWER REQUIREMENTS AS POSSIBLE ARE PREPARED TO ACCEPT YOUR RECOMMENDATIONS.

7. PROJECT TITLE: AGRICULTURAL RESEARCH AND EXTENSION AS A TITLE DOES NOT ACCURATELY REFLECT THE NATURE OF THIS PROJECT. WE RECOMMEND THAT THE TITLE BE CHANGED TO A MORE SUITABLE ONE SUCH AS TITLE USED AS SUBJECT OF THIS CABLE.

8. MANPOWER NEEDS BY THE MISSION: PLEASE ADVISE AS TO AID/W OR OTHER ASSISTANCE MISSION MAY REQUIRE IN DEVELOPING THE PP. TAB HAS THREE PROJECTS IN SORGHUM THAT ARE IN COOPERATION WITH PURDUE, UNIVERSITY OF NEBRASKA, AND TEXAS A AND M WHICH COULD BE TAPPED FOR ASSISTANCE.

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SIMILARLY, THE BUREAU, THROUGH OUR IQC SYSTEM, HAS A MANPOWER RESOURCE THAT THE MISSION COULD EFFECTIVELY UTILIZE IF DESIRED. OTHER ALTERNATIVE SOURCES OF MANPOWER MIGHT BE ALAD OR ICRISAT. WE HAVE CONTACTED DR. CUMMINGS OF ICRISAT AND HE IS AWARE OF THE PROPOSED PROJECT. HOWEVER, WE HAVE NOT YET RECEIVED A REPLY FROM HIM. WE SUGGEST YOU CONTACT THESE INSTITUTIONS DIRECTLY.

WE ARE OPEN TO SUGGESTION AS TO HOW WE CAN BE SUPPORTIVE TO THE MISSION IN THIS AREA OF CONCERN WHICH IMPACTS NOT ONLY ON THIS PROJECT BUT ALL OTHER MISSION ACTIVITIES AS WELL. KISSINGER

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UNITED STATES GOVERNMENT

ANNEX 7

p. 1

Memorandum

TO : Mr. Aldelmo Ruiz, AID Representative

DATE: February 8, 1975

FROM : Clyde S. Adams, Food & Agriculture Officer

Clyde S. Adams

SUBJECT: Evaluation of the Sorghum Production
Project, 279-018

A team made up of Dr. Leland House, Dr. A. Conje, Mr. John Young, Mr. Charles Antholt and Mr. Clyde Adams conducted an evaluation of the Sorghum Project. A summary of the team's finding is attached as well as the resulting draft project appraisal (PAR).



Summary Sorghum Evaluation Team's Findings
Sana'a, Yemen January 27-31, 1975

The purpose of the project is to identify improved sorghum and millet varieties, develop complementary improved production practices, and develop a cadre of YARG personnel capable of conducting adaptive research on sorghum and millet. The project, to date, has taken only the first steps of this process. On the basis of initial work, however, some significantly improved varieties have been identified which appear very promising. For example, some of the best introduced varieties of sorghum and millet yielded three to four times the local variety used as a check. (Since most of these varieties have only been tested in unreplicated single rows at one location the test results can not yet be considered conclusive).

Other initial project achievements, while less satisfactory, have been in the training of YARG personnel and research station development. Three participants were sent to a 7 month sorghum production training program at ALAD facilities in Beirut while these and other staff received "in service training" under Dr. Conje. On the Ber El Khoum farm, about 6 acres of the total 30 acre station were fenced, leveled and irrigated.

Also of note should be the performance of the contractor. Dr. Conje, while relatively young, has performed exceptionally well. We think the manner in which he conducted the research trials under trying circumstances was particularly praiseworthy. Similarly, the on-the-job training he has given YARG personnel has been extremely effective and well received.

The primary difficulties experienced in implementation of the project have been in connection with participants and delivery of commodities. The participants sent out for training have been well motivated individuals with a commendable willingness to work and learn. The difficulty has been with their weak academic and technical background which has made it difficult for them to capitalize fully on their training. In fairness to the YARG and USAID, it should be mentioned that the time for participant selection was extremely short. The delivery of commodities was delayed by the extreme ineptness of the U. S. procurement agency.

In looking toward the future, we see substantial strengthening of Yemen's sorghum and millet program as essential. The absolute and relative importance of these grains to the population and economy of the country dictates this and we feel the U. S. can enthusiastically support it. Further we recommend a strengthening of the current project by placing prime emphasis on the

- 2 -

development of a National Sorghum and Millet Improvement Program as apposed to the current narrower emphasis on varieties and cultural practices. A multi-year staffing profile for the program, as proposed by Dr. House, is attached.

In summary we feel the sorghum project has progressed satisfactorily under very difficult circumstances. The contractor's ability to carry out his assignment and the support of the YARG are to be especially noted. We want, however, to emphasize that the project to date has taken only a first step. We believe the revised program as outlined is a recognition of the progress to date and reflects that experience. The program we believe deserves and will receive AID/W support. Likewise the program is in response to the extreme importance of Sorghum to Yemen and should be seriously considered by the YARG. As we see it the major challenge to the YARG is to accord the sorghum program the high priority it deserves and to act on that basis, particularly in the process of allocating manpower resources.

JDS Descriptions

Coordinator; Joint Coordinator

Be an active plant breeder; much of the useful material generated for the program will come from the coordinator.

Tie together all phases of the crop improvement program; this requires familiarity with work in all disciplines, all stations, and in the countryside.

Represent the program to government - he is the contact between the program and the government.

Call a periodic (annual) workshop

Organize an annual progress report

Assist with budgeting and operational problems including the availability of equipment.

Plant Breeders

To provide continuity of operation at each station. Initially these people provide support to the coordinator but develop into breeders of stature. They will sooner or later:

- a. Organize and advance material in nurseries.
- b. Conduct locally and regionally organized yield trials.
- c. Operate crossing blocks.
- d. Assist in maintenance of collections and of breeders seeds. (The legume breeder would first evaluate collections of the 2 or 3 most important legume crops and begin a program of selection from the collections - collections would include local and introduced types).

Collector

An individual either now with the program or to be identified who would be a continuing part of the program but for a 3 year period spend the maturation and harvest period collecting seeds of sorghum, millet, and other crops of agronomic importance in Yemen.

Agronomist

To undertake research leading to a package of management practices for irrigated and dry conditions. This includes evaluation of such things as sowing date, rate and timing of fertilizer application, and spacing in the various agro-environmental conditions in the country.

Where water is available to work on intensive cropping systems, particularly those involving sorghum, millets, and food legumes.

To assist, as necessary, with experiment station development. :

Initially, the foreign agronomist would assist with extension functions so should have some interest and proficiency in this area. He would train Yemeni counterparts in both agronomy and extension.

Extension

To liason between the research and extension program and to be familiar with farmer problems.

To be an extension education officer and provide training for the large number of individuals required to carry out an effective extension programs.

To keep a constant vigil on the quality of extension demonstrations. Seed production and marketing (not properly part of the research program).

It is relatively easy to describe and write up a seed production and distribution program and very difficult to implement it. Because of this it is suggested that a qualified individual initially spend 4 to 6 months learning about conditions in the country and helping AID and the Ministry of Agriculture write up a seed production-distribution program. Subsequently, he would return at a critical time of the year for a 2 - 3 month period initially, and shorter time subsequently to help solve problems of implementation.

Production Officer - this should be a motivated, talented individual who might spend time (6 months to a year) in the USA working under the direction of the consultant. He should be in Yemen when the consultant is in Yemen.

He would have responsibility for such things as:

- a. Training farmers who would participate in the seed production function.
- b. Assist with on the spot farmer production problems.
- c. Train technicians to help with farmer production problems and post harvest manipulations.
- d. To assist with the creation of and operation of drying, threshing, cleaning, treating, bagging equipment and functions.
- e. To be knowledgable about seed inventory.

Qualify Control Officer - this should also be a motivated, talented individual who might spend time (6 month to one year in the USA) working under the direction of the consultant. He should be in Yemen when the consultant is in Yemen.

He would have responsibility for such things as:

- a. Establish and operation of a seed testing lab so that such things as germination percentage, percent foreign seeds, and percent inert material can be identified on a seed lot basis.
- b. Be responsible for at least one field inspection to determine isolation and percentage off type plants.
- c. To implement any tagging or other aspects of a quality control function as might be included in the program.
- d. To assist in the training of technicians to help in the seed lab and with field inspection.

In no situation should the production officer and quality control officer be the same man.

Plant Protection

Initially, a foreigner, possibly a qualified individual on sabbatical leave could evaluate the insect, disease, and other pest problems of importance to production and storage. Two capable and interested individuals should be associated with his work in Yemen. These individuals should have academic qualification that would subsequently permit them to undertake advanced study as deemed necessary by the consultant.

The pathologist and entomologist would round out a team of specialists focused on the problems of sorghum and millet production.

Flow Sheet for an all Yemen Coordinated
Sorghum and Pearl Millet Crops Improvement Program

Main Location Sanaa, Second Locations, Taiz and Hodeida

	Years																									
	75	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Personnel																										
Coordinator																										
Foreign		c	c	c	c	c	c	c	c	c	jc	jc	jc	jc	jc	jc	phase	out								
Yemeni		p	t	a	a	a	a	a	j	j	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
Breeders (Yemeni)																										
Sanaa																										
Sorghum		p	t	a	a	p	p	a	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Millets		p	p	p	t	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Collector		p	p	p	drop	out																				
Legumes		t	p	p	a	a	p	p																		
Taiz (Sorghum & Millets)		p	t	p	p	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Tehama (Sorghum & Millets)		p	p	p	t	p	p	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Agronomy and Extension																										
Foreign																										
Agronomist (Yemeni)		p	t	p	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Extension Officer (Yemeni)		p	t	a	a	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Seed Production and Marketing																										
Foreign (consultant)			6	2	2	1	1	1	1	1																
Production Officer (Yemeni)		p	t	p	t	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Quality Control Officer (Yemeni)		p	t	p	t	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Plant Protection

Foreign (Consultant)

Pathologist (Yemeni)

p p a a p

Entomologist (Yemeni)

p p a a p

C=Coordinator, JC=Joint Coordinator, P=Participant, T=Practical Training, A=Academic Education

1. PROJECT NO. 279-11-130-018 2. PAR FOR PERIOD: Feb. 12, 73 to Dec. 31, 74 3. COUNTRY Yemen 4. PAR SERIAL NO. 75-3 8-1

5. PROJECT TITLE Sorghum Production ANNEX 8

6. PROJECT DURATION: Began FY 73 Ends FY 76 7. DATE LATEST PROP 2-12-1973 8. DATE LATEST PIP NA 9. DATE PRIOR PAR NA

10. U.S. FUNDING a. Cumulative Obligation Thru Prior FY: \$ b. Current FY Estimated Budget: \$ c. Estimated Budget to completion After Current FY: \$

11. KEY ACTION AGENTS (Contractor, Participating Agency or Voluntary Agency)
 a. NAME International Voluntary Services, Inc. (IVS) b. CONTRACT, PASA OR VOL. AG. NO. AID/ASIA - C - 1056-2

I. NEW ACTIONS PROPOSED AND REQUESTED AS A RESULT OF THIS EVALUATION

A. ACTION (X)			B. LIST OF ACTIONS	C. PROPOSED ACTION COMPLETION DATE
USAID	AID/ #	HOST		
X		X	Develop a National Sorghum and Millet Improvement Program. In form of a new project with expanded scope which will: A. Identify and give five year projections for: 1. Staff 2. Training 3. Facilities 4. Equipment B. Outline the Research Program including: 1. Varietal Trials 2. Agronomic Trials 3. Off Station Research Activities C. Project necessary seed production program and requirement. D. Project necessary extension or outreach program.	April 30, 1975
X			Prepare revised budget for FY 75	March 5, 1975
	X		Approve PP for expanded project	June 30, 1975

D. REPLANNING REQUIRES REVISOR OR NEW PROP PIP PRO AG PIO/T PIO/C PIO/P E. DATE OF MISSION REVIEW

PROJECT MANAGER: TYPED NAME, SIGNED INITIALS AND DATE Clyde S. Adams *CSA* 2/11/75 MISSION DIRECTOR: TYPED NAME, SIGNED INITIALS AND DATE Aldelmo Ruiz *AR* 2/12/75

II. PERFORMANCE OF KEY INPUTS AND ACTION AGENTS

8-2

A. INPUT OR ACTION AGENT CONTRACTOR, PARTICIPATING AGENCY OR VOLUNTARY AGENCY	B. PERFORMANCE AGAINST PLAN							C. IMPORTANCE FOR ACHIEVING PROJECT PURPOSE (X)					
	UNSATISFACTORY		SATISFACTORY			OUT-STANDING		LOW		MEDIUM		HIGH	
	1	2	3	4	5	6	7	1	2	3	4	5	
1. IVS					X								X
2.													
3.													

Comment on key factors determining rating

The contractors understanding of project purpose, technical qualifications, training of local technicians and administration of participants were rated superior. In all other categories the rating was listed as planned. No unsatisfactory ratings were given.

4. PARTICIPANT TRAINING	1	2	3	4	5	6	7	1	2	3	4	5
			X							X		

Comment on key factors determining rating

The training conducted by ALAD was considered outstanding. The participants' academic and technical background were, however, less than required to obtain maximum benefit from the training program. On the other hand the participants' motivation and willingness to learn were exceptional. Part of the problem was due to inadequate time to select candidates.

5. COMMODITIES	1	2	3	4	5	6	7	1	2	3	4	5
		X									X	

Comment on key factors determining rating

The performance of the procurement agency was considered unsatisfactory, particularly the procurement of farm machinery. Other more minor elements were procured as planned.

6. COOPERATING COUNTRY	a. PERSONNEL											
	1	2	3	4	5	6	7	1	2	3	4	5
			X									X
	b. OTHER											
				X								X

Comment on key factors determining rating

The technical, planning and management skills of the YARG project personnel were below those required. See (4) above. Also, one promising technician was assigned to another project after working on sorghum for several months. In all other important aspects the YARG's performance, while not rated superior, was as planned.

7. OTHER DONORS	1	2	3	4	5	6	7	1	2	3	4	5
						X				X		

(See Next Page for Comments on Other Donors)

4. Participant Training

(the decision to send candidates was made only a short time prior to the start of the ALAD program).

Annex A

Note: The following comments are intended to supplement the objective analysis provided on the PAR form.

A review and evaluation of the project was conducted during the last week of January 1975 by a team including representatives from NESAT/TECH, the Arid Lands Agricultural Development (ALAD) staff in Beirut, USAID Staff, the IRBD Advisory Group, and YARG officials. The unanimous view of this team was that, considering the short time the project has been underway, its results show much promise for increased Sorghum/Millet production in Yemen. Introduced varieties have tentatively been identified with significantly increased yields of both grain and forage. A more modest start has been made in identifying improved cultural practices to complement the new varieties. (One interesting note is that traditional varieties apparently do not show an economic response to new practices). The project has also made a modest start towards the development of research facilities. While these will need to be expanded in the future, they have been acceptable for the present. Likewise the project has initiated a training program which is considered satisfactory given the general difficulty in obtaining technically qualified Yemenis for any development effort. The YARG, however, will have to assign a higher priority to personnel if this project technical promise is to be realized.

In summary, we believe the project has made very satisfactory progress given the very short time it has been underway and the rather difficult conditions in existence in the Yemen.

11. 7. Continued: Comment on key factors determining rating of Other Donors

- 8-4
1. Ford Foundation assistance in this project was outstanding. Without its help the project would not have moved as well as it has.
 2. The West German assistance in station development and general support was considered outstanding.
 3. FAO also provided excellent cooperation and assistance in plots planted in Taiz and Hodeidah.

III. KEY OUTPUT INDICATORS AND TARGETS

A. QUANTITATIVE INDICATORS FOR MAJOR OUTPUTS		TARGETS (Percentage/Rate/Amount)					
		CUMU- LATIVE PRIOR FY	CURRENT FY		FY ____	FY ____	END OF PROJECT
			TO DATE	TO END			
Varietal Trials	PLANNED	Not Specified					
	ACTUAL PERFORM- ANCE	8	32				
	REPLANNED			44	56	56	
Cultural Practices Trials	PLANNED	Not Specified					
	ACTUAL PERFORM- ANCE	0	4				
	REPLANNED			10	16	16	
Research Station Establishment	PLANNED	1	1	1		1	
	ACTUAL PERFORM- ANCE	1	1				
	REPLANNED			0	0		
Participant Training	PLANNED	4	4	4	4	4	
	ACTUAL PERFORM- ANCE	3	3				
	REPLANNED			1	1		
B. QUALITATIVE INDICATORS FOR MAJOR OUTPUTS		COMMENT:					
1. Varietal and Cultural Practices Trials		Based on initial varietal trials, significantly higher yield potentials were noted in introduced sorghum and millet varieties. Agronomic trials to date have been limited. They were indicative but less conclusive than the varietal trials.					
2. Research Station Establishment		COMMENT: Only about 1/5 of the originally planned station area has been developed. This, however, has been an acceptable minimum for current research requirements.					
3. Training		COMMENT: Participant training at the ALAD facility has been excellent. In addition "in country training by the contractor has been regarded as superior. A major limitation, however, was the quality of the participants available, particularly in terms of educational and technical background (see item 4, page 2).					

IV. PROJECT PURPOSE

1. Statement of purpose as currently envisaged. 2. Same as in PROP? YES NO
1. Identify and develop more productive sorghum and millet varieties and complementary cultural practices.
 2. Develop a minimum cadre of YARG personnel capable of conducting adaptive agricultural research in sorghum and millets.

a. 1. Conditions which will exist when above purpose is achieved.	2. Evidence to date of progress toward these conditions.
<ol style="list-style-type: none"> 1. More productive sorghum and millet varieties. 2. More productive cultural practices developed. 3. Staff capable of and conducting research on sorghum and millet. 	<ol style="list-style-type: none"> 1. On initial trials the best introduced sorghum and millet varieties have yielded three to four times the local variety used as a check. 2. Initial trials indicate local varieties show little or no response to improved management practices such as fertilizer application, however, introduced varieties showed marked increases in yield as improved practices were utilized. 3. Three YARG staff members were selected and attended the seven month ALAD practical training program in Lebanon

V. PROGRAMMING GOAL

A. Statement of Programming Goal:

Increase Agricultural Production

B. Will the achievement of the project purpose make a significant contribution to the programming goal, given the magnitude of the national problem? Cite evidence.

Over 80% of the cultivated land area is devoted to sorghum and millet production. (According to IRBD report), currently Yemen's cereal production is not sufficient to meet domestic requirements. Achievement of the project purpose is a necessary pre-requisite need to achieve the YARG's goal stated above.

The Cultural Environment

The Yemen Arab Republic with an area of about 190,000 km², is bounded by the Red Sea on the West, Saudi Arabia on the North and East, and the People's Democratic Republic of Yemen on the South. Its population is about 6 million with an annual growth rate estimated at 2.2%. Literacy ranges between 5 and 10%. Prior to 1962, the country, under the Imam's religious and political leadership, was virtually insulated from developmental activities. A military coup in 1962 removed the Imam and set up a republican government; a civil war then erupted between the Imam's supporters and the republicans. Almost concurrently with the civil war, the country was subjected to the effects of a very serious drought. While the Government has made considerable progress in consolidation, the nation still remains, in many respects, a confederation of sheikdoms, and the Central Government has somewhat limited authority, particularly in remote areas.

After the war ended in 1970 the Government initiated economic development programs, financed mostly from bilateral aid. These efforts have established minimal transportation trunklines and are pushing ahead in irrigation, power, and development of other basic infrastructure. Even so, the job is barely begun. The Yemen Arab Republic is one of the poorest countries in the world with a per capita income estimated at \$50. The Government cannot cover budget expenditures with domestic revenues. Exports account for only 7% of imports; the remainder being covered by remittances from Yemenis living abroad. The bulk of the population exists on subsistence agriculture. Still, Yemen cannot feed its people; food imports account for half of total imports.

The Central Government is a creation of the last decade. Even though there is a Central Bank, a Budget Bureau in the Ministry of Finance, and a Central Planning Organization (which has produced a 3-year plan), systematic collection of statistics is just beginning. For example, the first census ever conducted was released, in May 1975. Most Ministries, including the Ministry of Agriculture are still weak, reflecting more than any other factor the limited availability of professional administrators and technologists. Many key positions are filled by experts from other Arab countries, notably Syria and Egypt.

ANNEX 10

The Physical Environment

The mountains of Yemen run North-South, parallel to the Red Sea, and East-West, paralleling the Gulf of Aden. The central mountain range of the Yemen Arab Republic starts around Taiz in the South and extends north into Saudi Arabia. From this central ridge, drainage westward to the Red Sea is carried by six major wadis (Mohr, Surdud, Siham, Rimah, Zabid, and Risyen). These and other minor wadis run down steep mountain slopes forming deep gorges which eventually open to the coastal plain known as the Tihamas. Eastern drainage is to the Empty Quarter over more gentle slopes. Drainage south to the Gulf of Aden is south of Damar and east of the Damar-Ibb-Taiz line. The main wadis of this region are Wadi Bana and Tuban.

This topography divides the country into four natural regions, each with distinct climatic characteristics and vegetation:

- 1) Lowlands of Tihama, along the Red Sea in the West.
- 2) Foothills and Middle Highlands of the central mountain range.
- 3) Central Highlands
- 4) Eastern Semi-Desert Plateau, sloping into the Empty Quarter.

The Coastal Lowlands of Tihama form a 30 - 60 km wide belt along the Red Sea, extending from Bab-el-Mandeb in the South well into Saudi Arabia in the North. The elevation ranges from sea level to about 200 meters at the foothills. The terrain is level or slightly undulating and intersected by wide, shallow wadis draining from the central mountain range into the Red Sea. All of the cotton and much of the cereal grains are produced in the Tihama region.

The Foothills and Middle Highlands are situated between the Tihama and Central Highlands with an elevation range of 200 to 1500 meters above sea level. The landscape is very rugged, cut by deep wadis running through narrow gorges which have very long and steep slopes. The Foothills and Middle Highlands area produce coffee, qat, cereal grains and a limited amount of tropical and sub-tropical fruits and vegetables.

The Central Highlands run from Ibb northward into Saudi Arabia at altitudes exceeding 1500 meters. The high plateaus of Sanaa Mabar, Damar and Yerim are all over 2000 meters elevation. The Central Highlands are devoted almost exclusively to the production of sorghum, millet and wheat with fruits and vegetables being grown in small irrigated areas around Sanaa and Taiz.

The Eastern Semi-Desert Plateau slopes eastward, falling to an elevation of 1,000 meters where it borders the Empty Quarter, Rub-el-Khali. This area, which lacks the rainfall for crop production, is devoted primarily to grazing of sheep and goats, camels and donkeys.

ANNEX 11

Policy Issues and Constraints

1. Priority & Relevance (see also body of Project paper)

A. Priority:

The YARG has set its priorities for agriculture in the first 3-year plan as follows:

- 1) Improving agriculture sector income
- 2) Increasing the quantity and quality of foodstuffs
- 3) Improving its foreign exchange position

USAID subscribes to these priorities, not only because we are directed by Congress to concentrate our efforts in food & nutrition and to work with rural poor, but also because it makes sound development sense.

Currently, USAID has four agricultural projects approved and/or requested whereby we anticipate meeting AID's guidelines and simultaneously assisting the YARG to meet its priorities.

The first priority, which this Project address, of both YARG and USAID is the cereals sector, especially sorghum and millet which are grown on from 2/3 to 1/2 of the cultivated acreage. (This is also in line with the IRBD sector review team's recommendation that the Yemen initially concentrate its efforts on foodgrains.) Project 018, and this project 030, concentrates on these crops. This project is a result of an evaluation of efforts to date in 018 and, when implemented, will result in significant acreage shifts as internal demands for sorghum are met. The anticipated yield increases will permit the following:

- (1) Provide for the needs of increasing population (though per capita consumption will probably go down as agricultural diversification permits diet substitutions)
- (2) Provide some feed grains for livestock use, especially poultry.
- (3) Release some crop acreage for forage production (such as legumes, grasses and forage sorghums).
- (4) Release land for production of other cereals especially wheat, barley and maize.
- (5) Release land for production of horticultural crops.
- (6) In addition to yield increases, a successful millet program coupled with moisture conservation techniques - being researched in such countries as Turkey and India and by such International organizations as (ICRISAT) International Crop Research Institute for the Semi-Arid Tropics -, can lead to expansion to crop acreage now marginal for production.

We believe the magnitude of inputs proposed in this paper will accomplish the above and that substantial additional inputs are better utilized in other

projects. Spin offs are expected from the sorghum project to wheat, barley and maize, because many of the techniques and practices are similar; therefore, we do not anticipate the need for substantial U.S. efforts to attain yield increases in these crops. Also farmers are acquainted with these crops.

Next in priority after the sorghum project is the YARG's concern with horticultural production and poultry. Success in sorghum will enhance both of these activities and is absolutely critical to poultry (i.e. feed grain production).

The two major physical constraints to agricultural production in the YAR are water (moisture) and good soil. It follows, then that agricultural production should move in the direction of maximizing the economic return to these two scarce resources. Since this requires considerable investment in agricultural research, agricultural extension, marketing and trained manpower, the YARG must start efforts now. The proposed horticultural project makes a very modest start in this direction. (It could be argued that attention to industrial crops such as cotton or perhaps soybeans would do the same, but these crops add relatively little to human nutrition and might further exacerbate the equity income distribution - situation since they are more likely to be grown by large farmers).

Horticulture provides one of the best opportunities for the YARG to improve incomes for the agricultural sector (see also equity section below) by expanding production of high unit value crops, improving the nutritional level of both producers and consumers (producers will consume unmarketable culls) by expanding dietary choices and reducing prices and reducing foreign exchange drain.

The poultry project is less broad in meeting YARG objectives. However, it does provide additional income (high unit value) for the small farmer (emphasis will be placed on small units and local development boards will provide the major focal point for administration). It is also aimed at higher protein diets and lessened foreign exchange drain. Expansion of the project will depend upon success in the cereals sub-sector.

The fourth project USAID is planning is rural development. This project seeks to demonstrate the benefits of integrated rural development in a self-help context and will be one of the vehicles, by which the results of research conducted in the three preceding projects will be carried to rural areas. It depends upon experience from the rural water project (022) for water and road development and upon the three agricultural projects outlined above for new crops and/or new varieties of existing crops plus accompanying set of cultural practices in order to maximize their effectiveness.

B. Relevance

The relevance of an AID supported project can be judged by how closely it fits the priority needs of the host country, its anticipated return (both short run and long run) to investment, ease of implementation and how it fits AID guidelines.

1. YARG agricultural goal of increased agricultural income, agricultural diversification leading to improved nutrition and reduced foreign exchange drain are all supported by this project. As stated previously, sorghum and millet occupy somewhere between 50 and 67 percent of the current cultivated acreage and are the major subsistence crops of the great majority of Yemeni farmers. If the country is to move into a monetary economy, these farmers must improve their yields in order to release crop acreage to other agricultural enterprise systems which provide greater income per unit of labor, capital, land and water. Nutrition should be enhanced by greater agricultural diversification as well as by increased availability of pulse crops grown in rotation with sorghum and foreign exchange drain should be lessened by reduced imports of basic foodstuffs. And finally, through moisture conservation techniques, land now considered marginal for sorghum and millet may be utilized.
2. It is also anticipated that the sorghum and millet project will serve as a model for other commodity improvement programs such as horticulture, oil seeds, other cereals etc. While the technology may be different, the methodology can be similar i.e. a package approach which combines technical inputs, administrative expertise and training. The "spin offs" should be considerable for other cereals in particular.

C. Equity

Equity considerations are difficult to sort out in this project but are estimated to be positive on balance. On the negative side is the fact that medium to large farmers will be in a position to more quickly capitalize on the new technology having better access to financing and with the potential for mechanization. On the positive side, smaller farmers are considered to be in a better position to shift part of their acreage to higher value crops such as horticulture. Further if increased production leads to significant price declines, larger farmers might move out of sorghum leaving the way clear for smaller farmers who can utilize unpaid family labor. Nutritionally, benefits should accrue to all classes from increased food availability and greater variety. And finally national income should be enhanced by lessened foreign exchange drain.

D. Policy Implications

Policy implications are also difficult to assess. Certainly it makes good sense, nationally, to make a major effort at improving crops which involve so much acreage and so many people. We believe this project is basic to the entire development process, with its great potential for: (a) meeting subsistence needs, (b) reducing cereal imports, (c) releasing acreage for higher unit value crops and (d) laying the basis for a sound livestock industry (i.e. providing grain and forage).

II Technical Considerations

A. Other donors have carried out some activities as indicated previously. Of particular import to this project is the fact that FAO has assigned two full time plant breeders from Egypt to its Taiz station. Both of these breeders have a one year contract; one will work on sorghum and one on wheat. FAO has agreed that the sorghum breeder will work closely with the USAID project in all

aspects including planning, implementation and evaluation, but that his geographical area will be confined to the Taiz/Ibb region in order to avoid duplication.

B. Constraints to Agricultural Development:

1. Introduction:

The YARG has made the decision to embrace a goal of economic, social and political development defined here as increasing the total availability of goods and services with more equitable distribution of these goods and services and more broadly based decision on their use and allocation in order to move from tradition to modernity. In common with IDCs, the problems include illiteracy (90-95%), lack of modern social overhead infrastructure (roads, communications, schools, medical services, etc.), low level of trained manpower and limited capital and technology. Further, the Yemen is very limited in its known exploitable resources, which are, for the most part, agricultural. If the YAR is to be successful in modernization, the agricultural sector must succeed, thus requiring major investments in attacking the constraints listed below.

2. Constraints:

a. Data Limitations

- (1) Physical resources inventory including information:
 - a) soils (mapping, classification, fertility, response to management, etc.).
 - b) Moisture-availability of moisture - amount and timing - conservation and use.
 - c) Wind and temperature information
- (2) Current and potential cropping systems. Fitting best crop to soil/moisture conditions
- (3) Livestock inventory, use and contribution
- (4) Forest resources (including nut & fruit trees) - current and potential contribution to soil and moisture conservation, timber, fuel, recreation, aesthetics & economic return
- (5) Range resources (interaction with 3 & 4)
- (6) Complementary & competing agricultural enterprise systems for varying ecological locations.

b. Institutional Framework

- (1) Manpower for development, including staffing of ministry and regional needs.
 - a) administrative
 - b) technical
- (2) Research Base
- (3) Extension Base
- (4) Credit needs
- (5) Marketing system (s)

c. Social Overhead Infrastructure

- (1) Roads
- (2) Transportation

- (3) Communications
- (4) Port facilities
- (5) Education

d. Socio-Economic

- (1) Government & Private capital needs
- (2) Income generation & distribution
- (3) Supply & demand
- (4) Food consumption, elasticities, etc.
- (5) Willingness and ability of people to innovate
- (6) Land tenure system
- (7) Taxation
- (8) Subsidies - direct & indirect

All of these constraints are serious, but most are amenable to the combined actions of time, capital and manpower. The solutions to most will require integrated action from a combination of areas outside agriculture but working closely with agriculture. One paramount issue (constraint) is the lack of a water policy covering technical, socioeconomic, political and legal parameters.

Basically, the above constraints all apply to sorghum and millet with the following probably being the most serious: moisture availability and control, cultural techniques, improved varieties and knowledge concerning use. The proposed project seeks to help solve these constraints or at least to mitigate their adverse effects.

Yemen and the Poorest of the Poor - The YAR is considered by the IBRD to be among the 12 least developed countries of the world and many observers would place it very near the bottom. By this criteria it could be concluded that almost any developmental activity is keyed to the poorest people. Moreover, while no accurate statistics exist regarding income distribution, simple observation indicates very little of the wide income disparities common to much of the developing world, especially in Latin America and the Sub-continent. Neither Sana nor Taiz has much of the outward indicators of conspicuous consumption common to Karachi, for example; neither does one see the extreme poverty, i.e. large groups of people sleeping on the street and starving children common to Calcutta or Dacca. Also, the contrast between the large masses of rural and urban residents is muted in the Yemen. The conclusion is that the great majority of all people are essentially equally poor.

Perhaps four hypotheses could be presented in explanation:

1. Large numbers of workers - about 20% of the total population is engaged in the labor force of surrounding Arab countries and remitting large amounts of capital - in some rural villages up to half of the total adult male population is engaged in this work.
2. A paternalistic, feudalistic type social structure which dictates concern on the part of the local sheikhs for all tribal members.
3. No large urban squatter populations common to newly industrialized centers of the sub-continent and Latin America, and
4. Fairly large (relative to YAR size) foreign donor capital transfers, mostly grants - which have been utilized in largely labor-intensive work activities, especially schools and hospitals. Even the more capital-intensive road construction and building work by other donors places a lot of disposable income in the pockets of many workers.

In summary, it would appear, almost by definition, that AID activities in the Yemen are keyed almost exclusively to the "Poorest of the Poor".

Yemen Absorptive Capacity

The absorptive capacity of the Yemen is probably one of the lowest in the developing world. Given the fact that it is very near the bottom of the least developed countries, this should not be surprising. Basic social overhead infrastructure, especially schools, civil service, transportation, and health, is only in a very rudimentary stage. The following crude estimates (1972) are indicative of the stage of development: 90% of the 6,062,000 population are subsistence farmers, 47% are not over 15 years of age, and of the 10% who are possibly literate, most did not go beyond primary school.

Developmental activities in a modern sense were only started with the overthrow of the Imam in 1962. Prior to this time the country was deliberately cut off from the rest of the world with life going basically unchanged from the 14th century. The development which started with the establishment of the Republic and violently interrupted by the long trauma of civil^{war} was worsened by years of severe drought. Only with the end of the war and normalization of relationships with Saudi Arabia in 1970 did the country really get launched on the process of development and modernization.

The Government has great difficulty in finding qualified staff to plan, direct and implement even the simplest of operations. While there are some excellent people at the top, they are so few in number that advisors from friendly Arab countries often are utilized in an operational capacity. The same situation is common to the private sector. The problems of scarcity are all pervasive and reach all levels of manpower - even artisans, mechanics, typist, truck drivers, as those skills are often exported to the oil-rich states.

In spite of these problems, the YARG is firmly committed to development and does the best it can in assigning qualified candidates to donor-assisted projects. In general U.S. AID and other donors have had reasonable success in getting counterparts assigned who can be trained to take over. The major exception to this was the Sorghum project, where an initially assigned B.S. graduate was assigned to another project, but later on he was replaced by another B.S. degree graduate. We have brought this matter to the attention of the Ministry and have received assurances (which we believe will be lived up to) that Ministry of Agriculture policy is to assign one University graduate and from one to two lower-level technical staff to each foreign technician.

The Ministry of Agriculture's problems in absorptive capacity are probably the most acute in the entire YARG. To suggest solutions to this problem, an IBRD team of advisors was recruited (currently with four advisors and three more to arrive) to advise the Ministry on administrative, financial and technical matters. The team has (cont'd page 2)

completed a five-year training proposal, approved by the Ministry, for upgrading and expanding the staff capability of the Ministry. This proposal indicates training needs by field, suggests training locations and shows requested sources of financing.

Training is divided into several areas: (1) institute training (mostly for two years beyond high-school) in surrounding Arab states, (2) B.S. degree training (also mostly in surrounding Arab Universities, (3) B.S., M.S. and high-level training in the U.S. and Europe where English or a European language is required. Two other sources of manpower training available to the Ministry: (1) Students returning to the YAR from non-government-sponsored training (this has averaged 5 - 8 B.S. - degree-trained individuals per year for the past few years) and (2) in country training, mostly for extension workers. For example, training of extension workers (mostly 6 - 9 months for individuals with about nine years education) is being carried out by FAO in Taiz and Hodeida and by IBRD in Zabid. Twenty individuals have just completed training, 65 are planned for this year and possibly 95 for several years thereafter. The bulk of these trainees will be used on FAO/WORLD BANK-financed project.

Since re-opening operations in the YAR in April 1973, USAID has been fully aware of this problem and in coordination with other donors has worked towards a solution which is practical for the Yemen situation. The first major problem has been an assessment of the Ministry of Agriculture's needs with proposals for solution. This problem has been worked on by the IBRD advisory team as mentioned above. Their plan has been formulated and is now ready for implementation.

The second major problem has been to either find qualified English speaking participants or make arrangement to send participants to Arab countries where language is not a problem. U.S. AID, in cooperation with USIS and Peace Corps, has made considerable effort to train Yemeni in English. Other efforts are being made by the U.K. and by the Institute for Public Administration (IPA). Considerable numbers of PCV and other volunteers are being utilized in these programs.

English speaking participants from the Ministry of Agriculture have been sent to Lebanon for training and, starting this year, will be sent to the U.S. In addition, the Mission is sending 25 agriculturists to Egypt for training to the B.S. degree level starting this October.

In summary the types of training U.S. AID will support are as follows:

- (1) English speaking participants will be sent to the U.S. for both short term training - mostly for high level individuals - and for advanced academic training and some highly specialized B.S. level training.
- (2) AUB and IILAD programs will be utilized also for English speaking individuals.
- (3) Arab speakers only will be sent to Arab Universities for training to the B.S. level and possibly some shorter programs.

Thus, while Yemeni absorptive capacity is very limited, because of its very lack of modernization, concerted efforts are being made to solve the problem. We can assist this process by having projects initially planned and directed largely by U.S. experts while conducting a large amount of training for Yemeni staff who will take over from the U.S. staff after being fully trained and experienced.

This Annex is in direct reply to questions and issues raised in STATE 070239, dated March 28, 1975 (Annex 6).

1. Question:

Given manpower and infrastructure base that Yemen has, is the project purpose and EOPS achievable in the project time frame?

Comment:

We believe that the YARG is fully committed to this project and will support it to the extent that other activities may suffer. We feel that five years will see achievement of all five EOPS activities. However, this is a very subjective statement and we agree with AID/W in revising goal as indicated in Para. 2 of STATE 070239. We do feel, though, that the project purpose, as stated, is attainable and should stand as is.

2. Question:

Time span: What is the rationale for selecting five years?

Comment:

Congressional mandates have dictated five years, but we feel Dr. House's 20-year span would be, maybe, more accurate. However, much can be accomplished in five years and an evaluation in the third year should determine our chances in achieving the purpose.

3. Question:

Priority and Relevance.

Comment:

We have substantially rewritten this section, and we are keeping in the foreign exchange expenditure issue since foreign exchange savings are a way of increasing funds for domestic allocation to other uses. However, we believe that the major relevance of the project is because sorghum and millet are so pervasive to the entire economy, in that the majority of farmers and the majority of the cultivated hectareage are involved. In this sense this project can serve as the "cutting edge" of development for the entire agricultural sector. Increasing production, plus extension of millet to some areas now uncultivated will: (a) release considerable acreage for higher unit value crops returning more income per unit of land, labor, capital and water; (b) enhance agricultural diversification, resulting in improved nutrition and (c) reduce dependency on imports (and/or permit exports) thereby improving Yemen's foreign exchange position.

4. Question: Equity.

Comment:

We have treated the equity questions at considerable length both in this PP and in the horticultural PROP dated 4/24/75. For this project our very subjective analysis is that, on balance, equity is neutral to positive. However, we agree that it is very difficult to assess. Further, we strongly believe the equity issue should be given more attention than in the past. However, major focus at the project level runs the risk of a distorted analysis. We prefer to treat the equity issue from an analysis of the entire agricultural sector in order to attain a more balanced view. The studies mentioned in SANA 2549 can be financed under project 026. We will appreciate, early on, AID/W assistance in developing draft scopes of work for Mission discussion with YARG. TDY assistance, if necessary, can be programmed then.

FYI: We would like to point out that the IBRD estimate of "90% of the cultivated acreage is farmed by tenants who pay one-half to two-thirds of their crop" is considered high by both Ministry of Agriculture and CPO officials.

5. Question:

Manpower requirements.

Comment:

We have emphasized the YARG manpower requirements in two places in the PP, i.e., the flow chart attached to Annex 8, and in YARG Inputs, Annex 2. The latter is especially important, as it budgets both people and financial requirements.

6. Question: Title.

Comment:

We agree with AID/W on the new title and only used "Agricultural Research and Extension" as this was in the Congressional Presentation.

7. Question:

USAID manpower requirements.

Comment:

The PP was reviewed in draft form by George Laudato and Jim Dalton during their recent TDYs in Yemen and reflects their comments and improvements.