

I. PROJECT IDENTIFICATION

1. PROJECT TITLE SORGHUM PRODUCTION PROJECT		APPENDIX ATTACHED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
3. RECIPIENT (specify) <input checked="" type="checkbox"/> COUNTRY YEMEN		2. PROJECT NO. (M.O. 1025.2) 279-11-130-018
<input type="checkbox"/> REGIONAL <input type="checkbox"/> INTERREGIONAL		5. SUBMISSION <input checked="" type="checkbox"/> ORIGINAL 2/5/73 <input type="checkbox"/> REV. NO. _____ DATE _____
4. LIFE OF PROJECT BEGINS FY 73 78		CONTR./PASA NO. _____

II. FUNDING (\$000) AND MAN MONTHS (MM) REQUIREMENTS

A. FUNDING BY FISCAL YEAR	B. TOTAL \$	C. PERSONNEL		D. PARTICIPANTS		E. COMMODITIES \$	F. OTHER COSTS \$	G. PASA/CONTR.		H. LOCAL EXCHANGE CURRENCY RATE: 5 L'S (U.S. OWNED)		
		(1) \$	(2) MM	(1) \$	(2) MM			(1) \$	(2) MM	(1) U.S. GRANT LOAN	(2) COOP COUNTRY (A) JOINT (B) BUDGET	
1. PRIOR THRU ACTUAL FY	-	-	-	-	-	-	-	-	-			
2. OPRN FY 73	95	10	2	2.5	8	36	46.5	-	-			1
3. BUDGET FY 74	45	20	12	5	16	14	6	20	12			4
4. BUDGET +1 FY 75	60	40	24	7.5	14	5	7.5	40	24			4
5. BUDGET +2 FY 76	250	40	24	30	60	20	160	40	24			4
6. BUDGET +3 FY 77	60	40	24	7.5	14	5	7.5	40	24			10
7. ALL SUBQ. FY 78	40	20	12	7.5	14	5	7.5	20	12			10
8. GRAND TOTAL	550	170	98	60	126	85	235	160	96			10

9. OTHER DONOR CONTRIBUTIONS

(A) NAME OF DONOR	(B) KIND OF GOODS/SERVICES	(C) AMOUNT

III. ORIGINATING OFFICE CLEARANCE

1. DRAFTER John J. Young	TITLE Agriculture Officer	DATE 2/5/73
2. CLEARANCE OFFICER Aldelmo Ruiz	TITLE AID Affairs Officer	DATE 2/5/73

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL

2. CLEARANCES

BUR/OFF.	SIGNATURE	DATE	BUR/OFF.	SIGNATURE	DATE
ASIA/NE	<i>[Signature]</i>	6/7/73	PFC/AG	<i>[Signature]</i>	02/06/73
ASIA/DF	<i>[Signature]</i>	6 Feb. 73			
ASIA/TECH	<i>[Signature]</i>	01/18/73			

3. APPROVAL AAS OR OFFICE DIRECTORS

SIGNATURE <i>[Signature]</i>	DATE 12/18/73
TITLE ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT	

4. APPROVAL A/AID (See M.O. 1025.1 VI C)

SIGNATURE	DATE

INTRODUCTION:

The Country:

The Yemen Arab Republic (YAR) is located in the southwest corner of the Arabian Peninsula and covers an area slightly over 75,000 square miles. The country is divided into four general areas:

1. The coastal plains: A 30-60 kilometer wide strip bordering the Red Sea and known as the Tehamas, it is a hot, dry area with an average rainfall of only 4-8 inches per year.
2. The foothills and midlands: This area, centered around Taiz and Ibb, is the agricultural heartland due to favorable rainfall patterns (25-33 inches, well distributed throughout the growing season).
3. The central highlands: A large area with the Capitol, Sana'a, approximately in the center. This wide belt of inter-mountainous plains has altitude varying from 5-10,000 feet and an average annual rainfall of from 12-15 inches.
4. The eastern area: This area offers the least possibilities agriculturally due to scanty, irregular rainfall patterns which diminish to zero as one moves eastward.

Government:

Yemen is divided into 8 administrative divisions called "Governates," which are further divided into 29 provinces and 120 districts. Following is a list of the eight governates indicating the sizes of areas and populations as estimated in 1972:

<u>Governate</u>	<u>Area</u> (1,000 km ²)	<u>Population</u> (000s)
Sana'a	80	2,022
Hodieda	35	809
Taiz	12	700
Ibb	13	900
Hajja	17	609
Saada	18	505
Radaa	10	209
Beida	15	204
TOTAL	200	6,062

(figures provided by the Central Planning Organization)

The Counterpart Institution:

The proposed host country counterpart for this project, the Ministry of Agriculture, is currently made up of 5 poorly defined departments.

However, a new structure has been approved for establishment in early CY 1973. The reorganized Ministry will be made up of the following departments:

1. Administration and Finance
2. Animal Resources
3. Agricultural Services
4. Irrigation and Drilling
5. Projects Statistics

These departments are further divided into 11 divisions which contain 30 specific sections. It is planned to have staffs representing the various departments at the governate level, and as more manpower becomes available, personnel will be allocated to the governate offices to represent each division of the Ministry.

The Target Sector:

80-98% of Yemen's $5\frac{1}{2}$ -6 million people are directly engaged in agriculture. With the varieties of climate, topography and soils, a wide range of crops are grown. Due to the many mountainous and low rainfall areas, however, only 6-8% of the country is intensely cultivated (tobacco, coffee, etc.), the bulk of the land being more suitable to rainfed cereal crops. Sorghum and millets are the principal cereal crops, both in terms of area planted and importance to the Yemeni diet. A list of the major agricultural crops of the YAR, and the approximate area which is thus cultivated follows:

Sorghum and Millets	1,100
Corn	50
Wheat	50
Barley	143
Sesame	8
Pulses	60
Potatoes	5
Vegetables	15
Cotton	15
Tobacco	4
Fruits	10
Grapes	7
Qat	43
Coffee (million trees)	(15)
Dates (thousand trees)	(370)

(Figures provided by YAR Central Planning Organization)

The Target Area:

The Sana'a Governate is the largest in the country, accounting for 40% of the country's territory and 33% of the country's population. The Governate has 9 Provinces, 39 districts, 484 sub-districts

4,807 villages. Of the 400,000 cultivated hectares in th. Sana'a Governate, 290,000 are devoted to sorghum and millets, 50,000 to barley, and 15,000 to wheat. The average yield in Yemen for sorghum and millet (in 1971) was reported to be approximately 1,200 kilogram per hectare. In the Sana'a area, however, the average yield was only 800 kilograms per hectare.*

Statement of Sector Goal:

The Yemen Arab Republic Government (YARG) has indicated the following long-range agricultural sector goals:

- Increased agriculture sector income;
- Provide for wider variety and increased quantity of food crops, livestock and poultry;
- Preserve foreign exchange through agricultural import substitution.

The YARG places a high priority on achievement of its agricultural sector goals, and to this end has expressed a desire to increase the production of its most staple cereal crops (sorghum and millets) on the relatively dry lands where cultivation of only such crops is possible, so that areas which receive more generous rainfall can be converted to other crops currently being imported (wheat, citrus, etc.). This project will partially respond to all three of Yemen's agricultural sector goals by assisting the Yemenis to attain greater productivity on lands currently planted to sorghum and millets and, to the extent possible, opening up new lands for sorghum and millets production.

Statement of Project Purpose:

The purpose of this project is to increase sorghum and millet production in the Sana'a Governate where over 80% of the cultivated acreage is planted annually to these two crops. A two-phase program is envisioned, concentrating first on adaptive research and later on extending the research results to farmers. Emphasis during both phases will be placed on laying groundwork for continuation of the activities by the Ministry of Agriculture and the private sector upon project termination.

Phase I - Research:

Phase I is a four-year program to assist the Production Division of the Ministry of Agriculture identify adapted, improved varieties of sorghum and millets and the related "package of practices" to use with such new varieties. This includes determination of fertilizer mixes, plant protection practices, dates for planting and rates of planting. Special attention must be given to economics,

*In the U. S., the average sorghum yield in 1971 was 3,180 Kilogram per hectare.

particularly regarding the economic risk to farmers of using new or additional inputs to increase production, and likewise the rate of return which can be expected when such inputs are purchased and applied on a commercial basis.

The subject of agricultural credit must also be studied as regards its effect on the long-term success of this project. Initial innovations such as a simple change in varieties used, or cultural practices will be of minimal cost to the farmer. Should additional, more costly inputs such as fertilizer and pesticides prove feasible (profitable), however, credit could well become a critical factor. Therefore, the agricultural credit situation in Yemen must be analyzed in anticipation of Phase II activity.

Although a breeding program would normally be incorporated into a project of this nature, this degree of sophistication is not envisioned for Phase I.

Phase II - Dissemination: The knowledge of improved varieties and a package of practices in itself will have no effect on sorghum or cereal production unless this knowledge and the necessary inputs are made available to the farmer. Our preliminary plan regarding this phase of the project is to assist the Services Division of the Ministry of Agriculture to organize, establish and train personnel for an Agro-Service system in the Sana'a Governate. This system would be a central Service Center in Sana'a which would service one satellite center in each of the 9 provinces in the Governate. Each satellite center would serve as a central location where the farmer could obtain the necessary inputs for increased production. Seeds, fertilizer and pesticides would be made available there by the private sector, and a representative of the Ministry of Agriculture would be available to conduct demonstrations and show the farmers how to utilize the inputs. If it proves feasible, a representative of the Agricultural Bank might also be located at the satellite center to make credit arrangements.

Approval is requested initially for only Phase I of this project. Any request for approval of Phase II activities described above will be subject to a comprehensive evaluation of Phase I activities at the end of their third year. For this reason, the following discussion of outputs and inputs relates only to Phase I.

Project Outputs (Phase I):

1. Establish a new research station, or convert an existing Ministry farm into a research station (first year).
2. Initiate at least three varietal testing trials in sorghums and millets. (first year).

3. Train 3 participants in research and station management
(first year).
4. Develop a preliminary package of cultivation practices
for the most promising varieties of sorghum and millets (second year).
5. Once acceptable "productivity packages" have been developed (while continuing refinements of varieties and practices), conduct a minimum of 18 demonstrations (2 per province) on farmers land. (Third and fourth years).

Major Assumptions:

1. The YARG continues to give high priority to agricultural production.
2. The YARG will supply trained or trainable personnel to this project.

Project Inputs (Phase I):

USAID:

Technicians	- 3 short-term technicians 1 long-term technicians
Commodities	\$60,000
Participants	3 for 8 months each (Beirut)

YARG:

Personnel	- 1 project manager 2 research officers
Land	Ber Lel Ghoum Research Farm or other suitable acreage

The YARG will assume the salary cost of any regularly assigned Ministry staff. If possible, they will also provide the necessary farm labor. Initially, the project will provide for recurrent costs such as pump operation and machine maintenance, however, the YARG should assume this type of operational cost as soon as they are financially able. Personnel costs such as per diem, cost of living, salary "topping" (if applicable) will be provided as described above for recurrent costs.

Rationale:

The rationale for this project and the choice of approach is as follows: Sorghum and millets are by far the most important cereal crop produced in Yemen. Yields are low with little or no research

or adaptive trials being implemented to improve production. USAID through this project can make significant progress toward increased cereal production. Over the past 3 years, Yemen has had an average annual import of 26.7 thousand tons of cereals. If the average yield per hectare in Sana'a alone of Sorghum, millets, wheat and barley could be increased to the national average, which is still extremely low by all standards, the import requirement would be cut in half. As poultry numbers and other livestock numbers increase, additional sorghum production for feed grain will become very important.

Course of Action:

Phase I (4 years)

The first year approach will be one or two TDY technicians accompanied by a sorghum expert from the Ford Foundation in Beirut to assist the YARG to establish introductory trials of sorghum and millets on the Ber Lel Ghom Farm or a similar area in March or April, 1973. These trials will include plant material from the Ford Foundation "Arid Land Agricultural Development Program," the Sorghum program of CIMMYT from Mexico City, the FAO sorghum program in Cairo and the TAB sorghum project.

Participants will be selected and a 7-8 month training program started in Beirut with the Ford Foundation. An IVS or other suitable technician will be made available to provide continuing technical and supervisory assistance to this project.

The second year will be a continuation of introductory trials with new plant materials. The promising varieties from the first year's trials will be placed in uniform yield trials. One or two of the most promising varieties will be used to initiate trials in fertilizer requirements, rate of planting and date of planting trials.

The third and fourth years will be a replication of the second year plus the addition of new varieties as applicable. During these years, demonstrations will be placed on farmers' land to determine their suitability under farmers' conditions and local acceptance to the new varieties. By the end of the fourth year, two or three varieties will be selected for farmer distribution. During the third or fourth year as promising varieties are identified some study and possibly simple research should be initiated on substitution crops for sorghum, multiple cropping schemes and more productive crop rotations. During the third year of the first phase of this project, results should be thoroughly evaluated and a decision made on proceeding to Phase II. If the evaluation indicates the goals and objectives of Phase I have been met and Phase II seems feasible and is approved, a second technician would be made available to assist the Ministry with Phase II.

Phase II (3 years)

The first year of this phase will consist of construction of the Agro-Service centers, training the personnel necessary to operate the facilities and harvesting a double crop seed increase program in the Tahama area to ensure adequate seed for farmer distribution. Research will continue on sorghum as in Phase I but to a lesser extent. Preliminary trials will be started on other cereals using the same technique as for sorghum in Phase I. The second and third years of this phase would be primarily to assist the Yarg with the operation of the centers and continue simple research on cereals.

Project Work Plan:

Prior to fielding a long-term technician, a multi-year time phased work plan will be completed and approved which will delineate YARG/AID Mission/Asia Bureau responsibilities and establish performance benchmarks.

APPENDIX A - Proposed Budget

FY-73	-	Consultant	\$10,000 ✓	
		Well and Pump	25,000 ✓	
		Construction	10,000 ✓	
		Fence	10,000 ✓	
		Vehicle	6,000 ✓	
		Commodities	25,000 ✓	
		Participant	2,500 ✓	
		Contingency	6,500	
				\$95,000
FY-74	-	IVS Advisor (1)	20,000	
		Commodities	8,000	
		Participants 2-16 mm	5,000	
		Vehicle	6,000	
		Contingency	6,000	
				45,000
FY-75	-	IVS Advisors (2)	40,000*	
		Commodities	5,000	
		Participants	7,500	
		Contingency	7,500	60,000
FY-76	-	IVS Advisors (2)	40,000*	
		Construction (Provincial)	90,000*	
		Construction (Center)	40,000*	
		Commodities	20,000*	
		Participants 10 - 60 mm	30,000*	
		Contingency	30,000*	

* The second advisor in FY 75 and 76 plus increases in all items in FY 76 are illustrative of a build-up for Phase II

YAR INPUT:

Research station - approximately 30 acres - Cost unknown
 Two Specialists - 2,000 each \$4,000