PD-AAA-179 (2)
615 0180

KENYA

DRYLANDS CROPPING SYSTEMS RESEARCH PROJECT

Project Paper
615-0180

August 1979

Agency for International Development
Washington, D.C. 20523

ACTION MEMORANDUM FOR THE ACTING ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: AFR/DR, ~~John W.~~ JWKoehring Koehring

SUBJECT: Kenya-Dryland Cropping Systems Research Project 615-0180

Problem: You are being requested to approve a life-of-project funding of $6,000,000 and to authorize a grant of $2,150,000 in FY 79 funds from the Food and Nutrition (FN) appropriation to the Government of Kenya for the Dryland Cropping Systems Research Project and for the procurement waivers described herein.

Discussion:

A. Project Description

A major thrust of the Government of Kenya's (GOK) recently issued Five Year Plan is the development of the arid and semi-arid areas of the country, a task in which the United States has been requested to play the leading role. This project will build upon and continue the ongoing activities of the AID-funded Food Crop Research Project, which was developed under the former East African Agricultural and Forestry Organization before the dissolution of the East African Community in 1977. These activities, which have been carried out as USAID/Kenya country activities since October 1977, emphasize developmental research required to solve the problems of the lower rainfall areas of Kenya. The project is designed to produce, through basic and applied research, an appropriate technological package of agricultural recommendations for the intended beneficiaries, the small-holder subsistence farmers of the semi-arid areas of Kenya's Eastern Province, and to assist in improving the delivery system for implementing the technological packages. The packages to be investigated and delivered will include recommended superior crop varieties and cropping systems, as well as improved cultural practices. When adopted by the target group, these packages can significantly increase crop yields while minimizing the risk of crop failures, thus, both enhancing agricultural production and improving the well-being of the rural poor.

Because of the relatively high risk and limited knowledge base, the Mission has stated in the recent Country Development Strategy Statement that it interds to follow a dual path of research and action-oriented programs in its approach to activities in the semi-arid land areas. This project is intended to serve as the research branch of the strategy designed to place the initial focus upon expanding the data base. Subsequently, it is anticipated that there will be a major shift towards larger action-oriented investments, particularly under the Arid-and Semi-Arid Lands Development project (615-0172) scheduled for approval, also this fiscal year.

B. Financial Summary

The total cost of the project will be $17,050,000 over a five-year period. The AID financial input of $6,000,000 will fund:

	FY 1979	LOP
1. U.S. Technical Assistance	$1,375,000	$3,972,000
2. Participant Training	550,000	1,256,000
3. Commodities and Equipment	225,000	572,000
4. Project Evaluations	-	200,000
TOTAL	$2,150,000	$6,000,000
FAO Component	28,500	3,650,000
GOK Contribution	256,986	7,400,000
GRAND TOTAL	$2,435,486	$17,050,000

The United Nations' Food and Agriculture Organization is a joint donor in this project with AID. While U.S. scientists will work with their Kenyan counterparts on relatively basic applied research, the FAO team will assist in field-testing and adopting relevant research findings so as to maximize the utilization of these findings by the Kenyan extension service and the ultimate target group, i.e., the small-holders. The cost of the FAO portion will be $3,650,000 over the five-year life-of-project.

The project will be implemented under the auspices of the Research Division of the Ministry of Agriculture which, in turn, supports the Kenyan Agricultural Research Institute (KARI) at Muguga where the AID technicians will be assigned. Seven U.S. scientists and technicians will be provided under a PASA agreement with the U.S. Department of Agriculture. They will be responsible to the Director of the KARI. The FAO personnel will be based at the Katumani Research Station.

Due to the high priority given to the development of the arid and semi-arid regions of the country in the Five Year Development Plan, maximum support can be expected from the GOK/MOA. The GOK's commitment to build up the KARI at Muguga as the national research center will ensure, along with appropriate conditions precedent, adequate research and office facilities with a capable administrative and support staff. It is critical to the success of this project that the GOK shall have established, by the end of the five-year term of donor involvement, a mechanism to assure a Kenyan capability to carry on independently. This aspect is addressed by the project's major training component which will also be a point of focus for the external evaluators. As a condition precedent, the GOK will be required to advise of its planning to retain qualified Kenyan agricultural scientists in its service, once trained. The recurring cost implications of the project for the GOK have been examined and have been found to be relatively small

and manageable. The GOK has a good record in meeting recurring costs on other projects and no particular problem is foreseen for this activity. The GOK will contribute $3.2 million to support the AID portion of the project and $4.2 million to support the FAO activities for a total of $7.4 million, or 43%.

C. Socio-Economic, Technical and Environmental Considerations

Although it is generally difficult to quantify rigorously, the pay-off or return on investment in agricultural research is quite high, expecially in the long term. Achievement of the objectives of this project is expected to result in significantly enhanced agricultural production and other economic benefits. The project is also cost effective with reasonable, quantifiable costs associated with the expected benefits. Estimated project recurrent costs are compatible with anticipated GOK budget resources. An official request of the GOK to undertake this project has been received.

The project has also been judged to be socially sound: the project is designed to ensure that project outputs have a positive impact on the small-holder farmers who are the ultimate target beneficiaries. There are no human rights implications to the implementation of this project.

As a result of the AID/W review of project documentation submitted by the USAID Mission, the specific technical activities proposed within the project appear to be technically sound.

As this project consists primarily of technical assistance and participant training, no serious negative environmental impacts should result. The minor construction element (the construction of a prefabricated house) will have only the usual temporary nuisance effects of noise and dust. Irrigation, land and water use, etc., will be undertaken in a controlled research environment. Small amounts of pesticides will be used exclusively for research purposes and are thus exempt from the normal pesticide procedures of Regulation 16. However, the procedures applicable to pesticide use in research projects will be followed. The Project Review recommends your approval of the Initial Environmental Examination recommendation for a Negative Determination.

D. Committee Action and Congressional Notification

The Africa Bureau Project Review met to discuss the project on May 22, June 1, and June 13, 1979. Several technical issues were raised at these reviews and satisfactorily resolved. A number of minor modifications will be made in the Project Paper as a result.

The Project Review recommended the following modifications to the project:

1. The Project Review requested the Mission to clarify its intentions concerning the hybrid maize research program. One of the two maize breeders will concentrate on breeding shorter maturing, higher yielding varieties of non-hybrid maize that can capitalize on the concentrated periods of rainfall characteristic of the semi-arid areas in question. The other maize breeder will be working on hybrid maize which is predominant throughout Kenya with an emphasis on intercropping/multicropping/tillage systems suitable to semi-arid areas. The cable detailing the justification for this approach is attached.

2. The itemized list of laboratory equipment, including a computer, for the Kitale Protein Laboratory is inappropriate to the service function agreed by all parties to be the purpose of the activities at that facility. The equipment list will be reviewed and revised by the USAID technicians upon their arrival in Kenya.

3. Following the submission of the Project Paper, the Mission has determined that the use of a mobile home to house technicians was too expensive and that a locally produced three/four bedroom prefabricated house was a more economical solution to the problem of housing the technicians.

In addition to the standard conditions precedent, the USAID will also require:

1. A Memorandum of Agreement signed by the USAID, FAO and GOK prior to disbursement of funds as evidence that FAO is committed to the program and that FAO funding and personnel will be available on a timely basis.

2. The submission by the GOK of a plan indicating that all necessary counterpart personnel for the project will be available on a timely basis.

3. A statement from the GOK requiring the retention of qualified Kenya scientists in this project.

4. As a C.P. to the availability of AID funds for training purposes, the GOK/MOA will be required to submit a life-of-project training plan.

The USAID also intends to include two special covenants in the Project Agreement:

1. A requirement to furnish rural sociologist services as determined necessary by both the FAO and AID-sponsored technical assistance teams.

2. A requirement to accept the joint FAO/USAID evaluation procedure over the life-of-the-project.

A procurement waiver to permit the purchase in Kenya of seven

5/4

project vehicles and one tractor of European manufacture has been submitted by the Mission with detailed justification provided in Appendix XVII of the Project Paper. These waivers have been incorporated into the PAF II attached for your signature.

The project was included in the FY 1980 Congressional Presentation. Since the $2,150,000 of FY 1979 FN funds is being made available to begin work this year, a Congressional Notification was prepared. The Congressional Notification was submitted to Congress on August 6, 1979 and will expire on August 21, 1979.

The Africa Bureau Project Officer responsible for the project is Cameron Pippitt, AFR/DR/EAP. The USAID/Nairobi Project Manager is Wilbur E. Scarborough.

Recommendation: That you sign the attached PAF II, and thereby authorize the proposed project, and that you approve the requested procurement waiver, and that you approve the Negative Determination recommended in the Initial Environment Examination, (Attachment 2).

Attachments:
1. - PAF II
2. - Environmental Determination
3. - State 156904, Nairobi 11178
4. - Project Paper

Clearances:
AFR/DR/EAP, MMcDaniel _____
AFR/DR/ARD, WJohnson (DRAFT)
AFR/DR/SDP, BBoyd (DRAFT)
AFR/EA, REney (DRAFT)
AFR/DP, GCauvin (DRAFT)
AFR/DR, NCohen _____ for
GC/AFR, ESpriggs _____
DAA/AFR, WHNorth _____

AFR/DR/EAP:CLPippitt:hrp:7/31/79:x28286

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

NAME OF COUNTRY : Kenya

NAME OF PROJECT : Research and Development of Agricultural Systems for Semi-Arid Areas

NUMBER OF PROJECT : 615-0180

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to Kenya (the "Cooperating Country") of not to exceed Two Million One Hundred and Fifty Thousand United States Dollars ($2,150,000) (the "Authorized Amount") to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The Project will consist of furnishing to the Cooperating Country technical assistance, participant training and supplies, equipment and materials, all designed to assist in development of technological packages benefitting agricultural small-holders in certain arid and semi-arid lands of Kenya. The Project is intended to be one component in a broader program, jointly funded by the Cooperating Country and the Food and Agriculture Organization (FAO) of the United Nations. More specifically, A.I.D. will furnish under the Project, inter alia, a technical assistance team at the Kenya Agricultural Research Institute (KARI) at Muguga, whose emphasis will be on relatively basic research. The FAO will furnish a technical assistance team at the Ministry of Agriculture's research station at Katumani, among whose major concerns will be adaptive research and delivery of the results of that research, through the Kenyan extension service, to drylands small-holders. The A.I.D. Grant will also be available for other forms of assistance, consistent with Project and Program objectives, at the Muguga and related facilities.

I approve the total level of A.I.D. appropriated funding planned for the project of not to exceed Six Million United States Dollars ($6,000,000), Grant, including the funding authorized above, during the period FY 1979 through FY 1984, subject to the availability of funds and in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiations and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Goods and Services

Goods and services financed by A.I.D. shall have their source and origin in the United States or the Cooperating Country, except as A.I.D. may otherwise agree in writing. Ocean shipping financed hereunder shall be procured in the United States, except as A.I.D. may otherwise agree in writing.

b. Conditions Precedent

The Project Agreement shall contain conditions precedent in substance as follows:

1. Prior to any disbursement of funds or the issuance of any commitment documents under the Project Agreement, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(a) evidence, in the form of a memorandum of agreement or comparable document, that the UNDP/FAO is committed to funding its components of the program and that such funding and personnel will be available on a basis and at times compatible with the successful and timely implementation of the A.I.D. project;

(b) a plan indicating that all necessary qualified counterpart personnel will be available for the program on a timely basis;

(c) a plan indicating what steps the Cooperating Country will take to assure that persons receiving longterm training will be employed at the KARI, or other acceptable institution, upon completion of such training.

2. Prior to the first disbursement of funds under the Project Agreement for participant training, or to the issuance of any commitment documents with respect thereto, the Cooperating Country will furnish to A.I.D., in form and substance satisfactory to A.I.D., a life-of-project training plan, prepared in collaboration with the project's technical assistance contractor, which will indicate, inter alia, the type and extent of proposed

training, justification for this level of training, and such other information as A.I.D. may reasonably require in Project Implementation Letters.

c. Covenants

The Project Agreement shall contain covenants in substance as follows:

1. The Cooperating Country agrees to establish, as part of the A.I.D. project and the program as a whole, a joint FAO/AID evaluation procedure over the life of the project, which will be contained in an annex to the Project Agreement and further elaborated upon in the Project Implementation Letters.

2. The Cooperating Country agrees to provide, on a timely basis, all qualified counterpart and technical personnel required for the successful implementation of the Project. In particular, the Cooperating Country will furnish at least one of the qualified rural sociologists to the UNDP/FAO-funded component of the program, and such supplementary assistance in this discipline as may be required.

3. The Cooperating Country agrees to consult with A.I.D., prior to any change in the present status of KARI as functioning under the direction of the Ministry of Agriculture's Scientific Research Division, concerning the effect of any such proposed change on the implementation of the Project and how any potential adverse effects might be minimized.

d. Waivers

Notwithstanding paragraph a. above, the following waivers to A.I.D. regulations are hereby approved:

1. The requirement set forth in Handbook 1, Supplement B, that commodities procured with grant funds have their source and origin in the U.S., is waived, based upon the justification set forth in Annex XVII to the Project Paper, to permit the procurement of seven Project vehicles, at an approximate cost of $95,000, which have as their source and origin countries included in A.I.D. Geographic Code 935. It is hereby determined that exclusion of procurement of the Project vehicles from countries included in Code 935 would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program; and that special circumstances exist which justify waiver of the requirement of Section 636(i) of the Foreign Assistance Act of 1961, as amended.

1°

2. The requirement set forth in Handbook 1, Supplement B, that commodities procured with grant funds have their source and origin in the U.S. is waived to permit procurement of one 45 horsepower tractor, accessories and spare parts, which have their source and origin in countries included in A.I.D. Geographic Code 935. It is hereby determined that exclusion of procurement of said equipment from Code 935 countries would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program.

1/14/79

Golof T. Butcher
Assistant Administrator
for Africa

1/12

INITIAL ENVIRONMENTAL EXAMINATION

Project Location	Muguga, Kenya
Project Title	Research and Development of Agricultural Systems for Semi-Arid Areas
Funding	$6,000,000
Life of Project	Five Years
IEE Prepared by	USAID/Kenya Project Committee
Date	April 1979
Environmental Action Recommended	Negative Determination
Concurrence	Glenwood P. Roane Mission Director
Date	April 1979

APPROVED: _____

DISAPPROVED: _____

DATE: 5/14/79

SUPPORTING STATEMENT

The program of which this project is a major part combines agricultural research with delivery of results of that research to smallholders. Both program and project will deal with improved methods of utilizing soil and water for agriculture production to enhance producers' returns. These improved methods of soil and water utilization will be beneficial in terms both of increased agricultural production and also reduction in soil erosion. More specifically, the present excessive soil loss during torrential rainfall leads to the silting up of dams and reservoirs and disruption of transportation by soil deposits on the roads. Erosion damages or destroys water supplies, roads and bridges. Both program and project are intended, inter alia, to decrease the soil loss and reduce the potential force and amount of water runoff through terracing and better cropping systems.

Both the program and project will study the diseases and insects adversely affecting crop production. Efforts will be made to breed pest-resistant crops. In addition, biological control measures will be studied to control harmful insects. Such measures will reduce the need for the use of pesticides and insecticides that may be harmful to the environment.

It is noted that a certain small amount (less than $4,000) of pesticides will be purchased for use under the A.I.D.-funded project. All such pesticides (which cannot be specifically identified until arrival of the team) will be used exclusively for research purposes and confined to small areas under controlled research station conditions. The objectives of this experimentation will be to reduce to an economically efficient minimum the amount of pesticides/insecticides now in use. PASA and GOK personnel will be made fully aware during project implementation of A.I.D.'s environmental standards concerning pesticides and project documentation will contain appropriate undertakings in this regard. The use of pesticides/insecticides and disposition of treated crops will be in accordance with Reg. 16, Section 216.3(b)(2)(iii).

There is only a minor construction element associated with this project. This consists of erecting one prefabricated four-bedroom guest house at the Kampi ya Mawe Research Station that would be used by project scientists during overnight trips to the facility.

Any irrigation or other land and water use activities will be undertaken in a controlled research environment. As a result, the environmental impact on land use, public health, water, and use of other natural resources will be negligible. The technical assistance team will be aware of A.I.D.'s environmental concerns (physical and sociocultural) and will be examining various technological packages in the light of

these concerns so as to develop packages optional both from a technological and an environmental standpoint.

Recommendation

The project will fund, primarily, technical assistance, and participant training. It will have no physical impact on land and water resources save in some instances of a controlled research nature. Requirements contained in Reg. 16 with regard to the use of pesticides in a research activity will be followed. Environmental considerations will be paramount in the research undertaken by A.I.D. technical assistance personnel.

It is concluded that the proposed project is not one which will have a significant effect on the human environment and, therefore, a negative determination is recommended.

Appendix 5A to HB 3, Part I
(TM 3:10)

16/14

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: [A] (A = ADD, C = CHANGE, D = DELETE)

PP

2. DOCUMENT CODE: 3

3. COUNTRY/ENTITY: KENYA

4. DOCUMENT REVISION NUMBER: [ ]

5. PROJECT NUMBER (7 digits): [615-0180]

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: [06]

7. PROJECT TITLE (Maximum 40 characters): [DRYLAND CROPPING SYSTEMS RESEARCH] 1/

8. ESTIMATED FY OF PROJECT COMPLETION: FY [87]

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY [79]; B. QUARTER [3]; C. FINAL FY [84] (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	1,890	260	2,150	5,681.0	319.0	6,000.0
(GRANT)	(1,890)	(260)	(2,150)	(5,681.0)	(319.0)	(6,000.0)
(LOAN)	(-)	(-)	(-)	(-)	(-)	(-)
OTHER U.S. 1.	-	-	-	-	-	-
OTHER U.S. 2.	-	-	-	-	-	-
HOST COUNTRY	10.0	247	257	35.0	7,365.0	7,400.0
OTHER DONOR(S) FAO	28.5	-	28.5	3,445.6	204.4	3,650.0
TOTALS	1,928.5	507.0	2,435.5	9,161.6	7,888.4	17,050.0

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 79 F. GRANT	E. 1ST FY 79 G. LOAN	H. 2ND FY 80 I. GRANT	H. 2ND FY 80 J. LOAN	K. 3RD FY 81 L. GRANT	K. 3RD FY 81 M. LOAN
(1) FN	141	080	-	2,150	-	850	-	1,261	-
(2)									
(3)									
(4)									
TOTALS				2,150	-	850	-	1,261	

A. APPROPRIATION	N. 4TH FY 82 O. GRANT	N. 4TH FY 82 P. LOAN	Q. 5TH FY 83 R. GRANT	Q. 5TH FY 83 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) FN	869.5	-	869.5	-	6,000.0	-
(2)						
(3)						
(4)						
TOTALS	869.5	-	869.5	-	6,000.0	

12. IN-DEPTH EVALUATION SCHEDULED: MM YY [01 81]

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

[NA] (1 = NO, 2 = YES)

To insure administrative/fiscal consistency this bilateralized former EAC project is being submitted as a new activity. It, however is in fact a continuation and revision to the EAC project, therefore no PID was submitted toAID/W.

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE

TITLE: Director, USAID/Kenya

DATE SIGNED: MM DD YY [05 03 79]

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY [ ]

AID 1330-4 (3-76)

1/ The official PP title: Research and Development of Agricultural Systems for Semi-Arid Areas has been abridged for brevity.

17/18

PROJECT PAPER

KENYA: RESEARCH AND DEVELOPMENT

OF AGRICULTURAL SYSTEMS FOR

SEMI-ARID AREAS

REF: FOOD CROPS RESEARCH PROJECT

618-110-10-657

SUBMITTED: APRIL 1979

19

KENYA: RESEARCH AND DEVELOPMENT OF AGRICULTURAL SYSTEMS FOR SEMI-ARID AREAS

TABLE OF CONTENTS

23/24

APPENDICES

I. ECONOMIC FEASIBILITY

II. TECHNICAL FEASIBILITY

III. ADMINISTRATIVE FEASIBILITY

IV. ENVIRONMENTAL STATEMENT

V. SOCIAL SOUNDNESS ANALYSIS AND THE ROLE OF WOMEN

VI. LOGISTIC SUPPORT FOR PROJECT

VII. FINANCIAL ANALYSIS (Appendices VII and VIII are consolidated.)

VIII. EXPENDITURES: EQUIPMENT, MATERIALS, SUPPLIES, PERSONNEL AND TRAINING

IX. CONTRIBUTION OF HYBRID MAIZE IN KENYA OVER THE LAST 10 YEARS

X. JOB DESCRIPTIONS OF PROGRAM TECHNICIANS

XI. PROJECT IMPLEMENTATION SCHEDULE

XII. ESTIMATED GOK CONTRIBUTION (Appendices XII and VIII are consolidated)

XIII. DRAFT PROJECT AUTHORIZATION

XIV. STATUTORY CHECKLIST

XV. GOK REQUEST FOR ASSISTANCE

XVI. SECTION 611 (e) DETERMINATION

XVII. DETAILED JUSTIFICATION FOR WAIVER

XVIII. LOGFRAME

XIX. REFERENCES

GLOSSARY OF TERMS

AFC	**Agricultural Finance Corporation**
ASSP	**Agricultural Systems Support Project (USAID/GOK)**
ATAC	**American Technical Assistance Corporation**
CIAT	**International Center for Tropical Agriculture, Palmira, Colombia**
CID	**Consortium for International Development (Logan, Utah)**
CIMMYT	**International Center for the Improvement of Maize and Wheat, Mexico City**
EAAFRO	**East African Agriculture and Forestry Research Organization**
EAC	**East African Community**
EAFCR	**East African Food Crops Research**
FAO/UNDP	**Food and Agriculture Organization/United Nations Development Program**
GOK	**Government of Kenya**
IADP	**Integrated Agricultural Development Program (World Bank financed program, designed to provide agricultural credit and technical services to small and medium sized farm holders)**
IITA	**International Institute for Tropical Agriculture, Ibadan, Nigeria**
ICRISAT	**International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India**
KARI	**Kenya Agricultural Research Institute, Muguga**
MOA	**Ministry of Agriculture**
MOCD	**Ministry of Cooperative Development**
NAL	**National Agricultural Laboratory**

ODM	Overseas Development Ministry (U.K.)
AID/PASA	Agency for International Development/Participating Agency Service Agreement
USDA	United States Department of Agriculture

87

I. SUMMARY AND RECOMMENDATIONS

Recommendations

1. Grant $6,000,000

2. Waiver: To permit the purchase in Kenya of seven project vehicles of European manufacture (probably U.K.) at an estimated value of $95,000.

Grantee

The Republic of Kenya, to be represented for purposes of the project by the Ministry of Agriculture Scientific Research Division.

Overview

A major thrust of the Government of Kenya's (GOK's) next Five Year Plan is the development of the arid and semi-arid areas of the country. The overall objective of the Plan is the alleviation of poverty through the provision of basic needs and creation of income earning opportunities.

The proposed project, entitled "Research and Development of Agricultural Systems for Semi-Arid Areas," will be in direct furtherance of this GOK objective. The major emphasis of the project proposed in this Project Paper (PP) will be on certain areas of the country (in Eastern Province) described as marginal in their agricultural capacity, due to limitations in average annual rainfall (500-760 mm per year); in current GOK terminology, those areas are classified as semi-arid. Specifically, the project is designed to assist, through basic and applied research, the development of an appropriate technological package of agricultural recommendations for the small-holders in those areas, perhaps 75 percent of whom are rural poor subsistence farmers; and to assist in improving the delivery system for implementing that technological package.

The packages to be developed and delivered will include recommended superior crop varieties and cropping systems, optimal planting times and improved cultural practices. When adopted by the target

group, these packages can significantly increase crop yields while minimizing the risk of crop failures, thus, both enhancing agricultural production and improving the well-being of the rural poor/subsistence farmers.

The proposed project will be implemented as part of a broader scale program to which the United Nations Development Program/Food and Agriculture Organization (FAO) is also to be a donor.[1/] FAO scientists will be based at Katumani (Ministry of Agriculture Research Station). AID furnished technicians will be assigned to the Kenyan Agricultural Research Institute (KARI) at Muguga. While complementarity will be stressed, AID scientists will concentrate with Kenyan counterparts on relatively basic applied research, while FAO scientists (who will include an agricultural economist/systems specialist) will assist in field-testing and adopting relevant research findings so as to maximize utilization of these findings by the Kenyan extension service and the ultimate target group, i.e., small-holders. Three prime objectives of this program, then, will be to ensure (a) that the small-holders' needs and wishes are made known to the researchers (both AID's and FAO's); (b) that research is adapted to those needs; and (c) that results of the research are in fact made available to and used by small-holders. A fourth prime objective will be the training of Kenyans to carry on this program, in due course, on an independent basis. A related and significant program benefit will be enhancement and improvement of KARI's status and capabilities as the Kenyan national agricultural research institution.

The project proposed for AID funding will, as indicated, be part of a systems approach for target areas. This approach will emphasize the accumulation and dissemination of technical information that will be beneficial to small-holder farmers in the target area. These target areas include Machakos/Kitui - the area most suited, from an institutional standpoint, for successful project implementation. Potentially, the project's methodology, and data generated, will be useful for application to similar agronomic problems in marginal rainfall areas of Kenya on a nation-wide basis.

This proposed project will be conducted in close collaboration and cooperation not only with FAO but also with other on-going USAID/Kenya projects; for example, it will draw upon the work of the arid and semi-arid lands team and will also relate directly to new activities to be developed under the Agricultural Systems Support Project (ASSP) approved in separate documentation for AID funding in

1/ Funding will be entirely from UNDP sources, with FAO active in management of that program component. For convenience, reference throughout this PP is hereinafter exclusively to FAO.

29

FY78. Together with other USAID-funded on-going activities, the proposed project will be aimed at alleviating constraints to agricultural production in the country (the lack of adequate adaptive research capability being one such constraint).

The currently proposed project will be carried out under the auspices of the Research Division of the Ministry of Agriculture (MOA). This project is viewed by that Ministry as an important component of its new program initiative in the dryland agriculture areas. U.S. scientists - to be provided under a USDA PASA agreement - will be directly responsible to the Director of KARI. Through a significant training component, the project will seek to establish within KARI a cadre of Kenyan technicians capable of effectively and independently carrying on the project; and probably of enhancing KARI's capacities more broadly, at the end of USAID financing. Thus, this five year project will include major elements of training of Kenyan staff, both in-country and abroad (U.S. and other countries), to acquire the necessary knowledge in solving problems associated with the semi-arid areas of the country.

Project Content

Further to the question of delivery, appropriate operational linkages will be maintained directly by KARI with the GOK Extension Service and the GOK's Integrated Agricultural Development Program (IADP). The AID-funded activity at KARI will have its primary relationship to the delivery of benefits of research to the smallholder, through the dryland farming activity and the Ministry of Agriculture extension services which will be responsible for sociological and economic inputs to the program.

The new project is proposed in recognition of the fact that increasing population pressure in the higher rainfall/higher potential areas has forced many families to migrate into the lower potential areas. Often these new settlers occupy land in the former livestock grazing areas which are less suitable for intensive crop production. Additionally, these settlers attempt to introduce agricultural traditions, crops, and varieties from the higher rainfall areas that often are inappropriate for the more arid zones. To assist these small-holders, the development and delivery of technology appropriate to their needs is viewed as critical.

30

This proposed project will build upon and continue the ongoing activities of the AID-funded Food Crops Research Project, which was developed under the former East African Agricultural and Forestry Organization (EAAFRO) before the dissolution of the East African Community (EAC) in 1977. These activities, which have been carried out as USAID/Kenya country activities since October 1977, emphasize developmental research required to solve the problems of the lower rainfall areas of Kenya. The currently proposed project will include research in the areas of soil physics, plant breeding (maize), plant pathology, agricultural economics and agronomy. In addition, work in the area of agrometeorology, designed to determine soil moisture relations and water requirements of various crops, will be continued. The research findings obtained by the U.S. research technicians working at Muguga (KARI), in collaboration with GOK counterpart technicians, will be made available to technicians being funded by FAO at Katumani for inclusion in the FAO's field trials and pre-extension testing before being assembled into a technological package for delivery to the target group by the GOK's Extension Service.

This project proposal also recommends funding for the continued provision of limited training of Kenyan staff and commodities for the Protein Quality Laboratory at Kitale, an activity which closely relates to successful accomplishment of the AID-funded effort at Muguga. In addition, the AID-funded team at Muguga will coordinate closely with an AID-funded advisor at the Plant Quarantine Station at Muguga (funded under other documentation) whose work in identifying and eliminating pathogens, which are carried on imported vegetative materials, is of direct relevance to the currently proposed AID-funded projects and is also of major importance to agriculture both in Kenya and elsewhere in East Africa.

Financial Contributions to Project 1/

	AID	GOK	FAO	TOTAL
Technical Assistance/ Implementation	$4,250	$6,408	$3,020	$13,678
Participant Training	1,179	96	330	1,605
Supplies, Equipment and Materials	571	896	300	1,767
	$6,000	$7,400	$3,650	$17,050

1/ See page 17 of Appendix VIII for details.

51

Project Implementation

This project (i.e., the USAID-funded project within the broader program) will require a moderate amount of Mission support. It will be operated under a PASA with The U.S. Department of Agriculture that will call for the provision of technical inputs as required both on a full-time and TDY basis. The USDA will purchase equipment and supplies both in the U.S. and Kenya, following AID regulations and guidelines. The USDA will also handle the development and implementation of all training activities. It is estimated that the agriculturalist on the USAID Food and Agriculture Staff will be able to handle this project on a significant, but part-time basis. Normal senior staff supervision and occasional ad hoc services (e.g., legal or contracting) are also anticipated.

GOK/MOA Commitment

Due to the high priority given to the development of the arid and semi-arid regions of the country in the next five-year Development Program, maximum support can be expected from the GOK/MOA. The location of the project at KARI, Muguga (formerly the headquarters of EAAFRO) will insure adequate research and office facilities with a capable administrative and support staff, to be supplemented to the extent appropriate by project contributions. The physical location is ideal for close cooperation with the National Agricultural Laboratory and the Faculty of Agriculture and Departments of Sociology and Economics at the University of Nairobi. The assignment of additional GOK personnel to the activities as required under this project proposal should receive high priority by the GOK because of its desire to build up KARI as the national research center. The commitment to develop effective scientific expertise within KARI to address the problems of the marginal rainfall areas has been strongly indicated.

FAO Commitment

Discussions with FAO have been very positive and, based on oral assurances, funding for the FAO project appears firm. However, a condition precedent to disbursement of AID funds will be documentary evidence that FAO is indeed committed to the program on a firm basis; and that UNDP funds for the FAO component will be forthcoming on a timely and adequate basis. Such documentary evidence would be a memorandum of understanding to be entered into by Government, FAO and USAID.

Evaluation Arrangements

Evaluation will be a continuing process during the life of the project and will include: (a) periodic assessments of accomplishments and objectives based upon approved work plans and (b) annual progress reports to be prepared by the USDA Team Leader in collaboration with FAO and the Kenya institutions as well as USAID/Kenya. There will be one outside evaluation 18 months following commencement of the program; another still 18 months further along; and a terminal evaluation of both program and project activities. To an appropriate extent, costs of the external evaluations are expected to be shared by USAID and FAO in a manner to be outlined in the memorandum of understanding discussed in the previous paragraph.

Issues

Critical to the success of the AID project, and the broader program of which it forms a part, are the following: (a) close collaboration among USAID, FAO and GOK scientists to the end that program and project research will be of real relevance to the Kenyan small-holder; (b) effectiveness of the Kenyan extension service in articulating the usefulness of that research, once done, to the small-holder; and (c) availability of other necessary inputs - credit, seeds, supplies and the like - to small-holders in addition to research results.

As to issue (a), this will call for close monitoring and consultation, with evaluations providing a good vehicle for project identification and resolution. Issue (b) is also of concern but it is noted that the Kenyan extension service has an increasing and important orientation toward small-holders; and that, through the AID-funded Agricultural Systems Support Project and otherwise, the extension service will be significantly enhancing its capability to reach the small-holder. Issue (c) is believed reasonably resolved since agricultural credit and other inputs are increasingly available to the Kenyan small-holders, including those in the project target area.

It is also critical that the program shall have generated and developed, at the completion of its five year term for donor funding, a mechanism to assure a Kenyan capability to carry on independently. This aspect is addressed by the program's major training component and will also be a point of focus for external evaluators. Furthermore, as a project condition precedent, the GOK will advise of its planning to retain qualified Kenyan agricultural scientists in its service, once trained.

33

Finally, the recurring cost implications of this project and program for the GOK have been examined and have been found relatively small and manageable. The GOK has a good record in meeting recurring costs on other projects and no particular problem is forseen relative to this proposed activity.

In summary, USAID considers that the project is an attractive and sound one and that the above-identified issues are satisfactorily addressed. Approval of the project for AID funding is recommended.

USAID Project Committee

Wilbur E. Scarborough	Agricultural Research Advisor Project Manager
Kevin F. O'Donnell	General Development Officer
Dominic D'Antonio	Assistant Program Officer
Boyd Whipple	Financial Analyst
Robert Lester	Lawyer, REDSO/EA
Donald McClelland	Program Economist

Project Evaluation/Design Team (USDA/PASA)

Mr. John M. Halpin	Team Leader
Dr. James E. Hunter	Plant Pathologist
Dr. Dale Sechler	Plant Breeder
Dr. Charles D. Whyte	Agricultural Economist

Approved by: Glenwood P. Rosne
Mission Director

II. DESCRIPTION OF THE PROJECT

Background

Agriculture in Kenya is undergoing a gradual but dramatic change. The people living in the more productive traditional agricultural areas of the country have utilized the land to the extent that as the population increases, the areas of more limited rainfall are being settled. The population increases of 3.5 percent per annum is rapidly extending agriculture into areas once used primarily for grazing. Usually, this internal migration takes place within the same traditional tribal land areas. However, some of the new settlers (the so-called landless people) have through one means or another acquired land in the former livestock (grazing) areas and are now beginning to develop agricultural enterprises. The strong majority (about 75 percent) of people in these areas are small-holder "subsistence" farmers, growing maize, sorghum, millet and grain legumes as subsistence crops; and cotton and sunflower, with small amounts of castor bean, sisal, fruits and vegetables as cash crops. Because crop failures in this area are a recurrent problem, many families living there receive periodic Government famine relief assistance.

The economy of the marginal rainfall areas is a blend of traditional and modern life: agricultural production remains traditional while services, mainly transportation, are being modernized. Income is derived from the sales of cash crops, home craft items, wages and remittances by relatives. The economy is not subsistence in the traditional sense; only half of the people's food needs are produced on the farm. Livestock is kept mainly as a store of purchasing power rather than as a revenue generating asset. Except for transportation and postal delivery, most services are inadequate.

The agricultural policy of the Government of Kenya (GOK) strongly emphasizes agricultural development (particularly in the marginal areas) as a means of increasing national productivity and employment, reducing dependence on imports and narrowing rural-urban income disparities. The emphasis on increasing agricultural productivity of small-holders farming units is of major importance in addressing the income distribution problem. The Government provides price incentives to producers, which vary over time and by crop. Agricultural pricing favors fixing the prices of several major food crops at all points in the marketing system.

The proposed project will, in terms of potential longer-term application, be concerned with all marginal rainfall areas (MRAs) of Kenya; also known as the semi-arid lands 1/ of the country, these areas comprise about 18 to 25 percent of Kenya's total land area and perhaps 15 percent of the population. The project will directly address those MRAs of the Kitui and Machakos districts of Kenya's Eastern Province. This Province is characterized by low and erratic rainfall that is bimodal in distribution and ranges from 500-800 mm per year.

Productivity levels of the areas are estimated to be rising at 1.5 percent per year, with net population rising at over 3.0 percent per year. Land utilization patterns for the areas are primarily:

(a) rainfed farming by small-holders with traditional technology, shallow (sometimes) stony soils, steep slopes and constraints of pests and unreliable rainfall; and
(b) rainfed farming by small-holders, with intermediate technology (i.e. fertilizers, insecticides and mechanization).

There is no large scale irrigation nor estate farming, except for one 2,650 ha., sisal estate. Small farmer irrigation is negligible; and rainfed arable farming, with modern technology, is confined primarily to the special case of tobacco growing.

Total estimated population of the two target districts for the currently proposed project - Machakos and Kitui - is 983,244; 662,847 in Machakos and 320,897 in Kitui. Per capita income is quite low (certainly less that $250 per year) and the people may by any standard be classified as rural poor. The majority (95 percent) of the rural population is of the Akamba tribe, a people willing to accept change and having strong achievement motivation and cooperative spirit. The spatial distribution of the population (53 persons per square kilometer) has been influenced by soil fertility, surface water and socio-economic factors. The social system of the Akamba people is characterized as loosely structured and adaptable, with a strong cohesive extended family (average 15 persons) or kinship units (average 45 persons). The land tenure system favors individual ownership rights; and the Government policy of adjudication of land title is having significant benefits. (Ref. 1).

1/ The terms "semi-arid lands" and "marginal rainfall areas" are often used synonymously in Kenya, a usage which will be noted in this PP.

There is a clear and fundamental need for problem oriented (applied) research in the MRAs if agricultural productivity and living standards in the marginal rainfall areas are to be increased; see for example, the 1974 DAP and 1975 DAP Supplement which identified inadequate adaptive research as one of the key constraints in this regard. The proposed project is designed to identify and solve problems through adaptive research and develop a technology that will provide maximum benefits to the MRA small-holder.

AID has a long history of supporting food crops research in East Africa. Original efforts, begun in 1964 under East African Community auspices, were concentrated primarily in high rainfall production potential areas of the country. More recently, research work has been started in the marginal rainfall areas of the Machakos District to develop cropping systems for the dryland areas. The AID-funded East African Food Crops Research (EAFCR) project has been carried out since the dissolution of the East African Community as a bilateral activity under AID/PASA No. AG/EAR-657-6-73; on a de facto basis, it has been part of the USAID country program since October 1977. The April 1978 evaluation of this project forms the basis for the proposed project, discussed below, which would build upon and enhance the effectiveness of this already ongoing AID/GOK activity.

Currently Funded Project

As a result of the deteriorating political/economic relationships among the constituent states of the East African Community[1/], the Government of Kenya decided in July 1977, to withdraw its support from several East African regional organizations and to concentrate its efforts on those activities which are exclusively Kenya based. The former regional East African Agriculture and Forestry Research Organization (EAAFRO) was therefore dissolved and has since been reorganized as a Kenyan national research center, the Kenya Agricultural Research Institute (KARI) at Muguga. KARI is planned to be the principal GOK agricultural research institution and KARI (MUGUGA) will be a major Kenyan national research center, possibly with autonomous status. (KARI is discussed in greater detail in Appendix III. In general, KARI is believed to be a reasonably mature institution. Gaps which have developed in KARI's staffing and capabilities are intended to be filled by the new project which is proposed in this PP).

USAID, beginning in 1972, had supported selected EAAFRO research efforts in the area of food crops and cropping systems in an attempt to increase food production and quality throughout East Africa. These

1/ Kenya, Tanzania and Uganda

37

efforts constitute the current AID project entitled, "East African Food Crops Research". This project has concentrated on:

(a) increasing the production and improving the quality of both high altitude and low altitude maize grown throughout the region;

(b) developing cropping systems appropriate for marginal rainfall areas;

(c) providing technical and financial support for the East African Plant Quarantine Station at Muguga

(d) supporting sugar cane research; and

(e) developing a cadre of East African scientists and technicians to assume full responsibility for agricultural research in the region.

The EAFCR has had five sub-projects in Kenya, all at varying times assisted by PASA and other personnel. Brief descriptions of these sub-projects, all of which have been supported by AID through PASA scientists, equipment, commodities and training 1/ follow:

1. Protein Quality Laboratory (PQL) - Kitale

The incorporation of high quality protein (tryptophane and lysine) with vitreous endosperm 2/ into high yielding maize populations or hybrids requires a means of determining chemical content of maize seeds without destroying seed viability. The PQL, utilizing techniques developed at CIMMYT in Mexico, performs this vital protein chemical analysis. This laboratory concentrates most of its efforts on selecting high protein maize germ plasm; however, work with sorghum, millet and food legumes is proposed for the future. The importance of this research activity is recognized if one understands that 40 percent of total crude protein in regular maize--the East African staple--is nutritionally unavailable to the consumer because of the limiting amino acids lysine and trytophan. The PQL, by identifying and supplying the Opaque-2 (high lysine-trytophan) germ plasm to breeders, can assist in substantially improving the nutritional qualities of maize grown and consumed in East Africa, and thereby improving the general health of the population.

1/ AID obligations to these sub-projects totalled approximately $2,640,000 as of July 31, 1978.

2/ The vitreous or "hard" endosperm maize varieties are preferred by the East African maize consumer.

2. Disease Resistance in Maize - Muguga

This sub-project seeks to develop an overall disease resistance program to solve the recurrent disease infestation problems which reduce maize yields in the low elevation areas of East Africa. The initial focus is on resistance to virus diseases, such as maize Streak and Sugar Cane Mosaic Viruses. Identification of the viruses and of sources of resistance to Streak are the major thrust of this effort. Maize grown in the lower altitudes is used primarily as a subsistence crop. Uncontrolled disease outbreaks in these areas retard development and produce famine conditions. This research activity is intended to help reduce the occurrence of such outbreaks.

3. Breeding Research - Kitale

This sub-project, in collaboration with the Protein Quality Laboratory, and the Disease Resistance activity, seeks to develop maize varieties that have the combination of high disease resistance, high yielding capability, and high quality protein endosperm. These improved varieties will be distributed to growers in East Africa.

4. Plant Quarantine Station - Muguga

The East African Plant Quarantine Station is a vital facility which protects Kenya and East Africa from the potentially dangerous introduction of plant diseases and pests into the region. Plant materials from all over the world are sent to the Station to be tested, certified disease and pest free, and released to agronomic testing centers throughout East Africa for planting trials. USAID has assisted EAAFRO by supplying an experienced Plant Quarantine Officer to direct this operation, and by providing laboratory equipment and other commodity support.

5. Cropping Systems for Marginal Rainfall Areas - Muguga and Katumani

This sub-project coordinates the research efforts of a four-person multi-disciplinary team (consisting of an Agrometeorologist, Agronomist, Agricultural Economist and an expected TDY Electronic Specialist) which is to develop comprehensive recommendations for improving semi-arid lands cropping systems and optimizing food crop yield responses to supplemental irrigation, when available, in the marginal rainfall areas. This team's recommendations are to be based on the findings obtained from research designed to enhance the GOK's ability to:

37

(1) quantify the water regime which a given crop or cropping combination will experience when soil, climate, food crop and cropping season are specified;

(2) predict yields of given food crops and cropping combinations grown in a water regime;

(3) adapt into the cropping systems soil tillage and conservation;

(4) incorporate drought escaping and drought resistant crop varieties into the cropping system;

(5) determine the social and economic constraints impeding implementation of cropping system recommendations; and

(6) evaluate alternate strategies for implementing and assessing cropping system recommendations.

In April 1978 the EAFCR Project was reviewed by an external team recruited by AID/W under PASA funding; see Part I above for identification of this team. This evaluation was appropriate in view of:

(a) the transition of the Project from regional (EAC) to USAID/Kenya bilateral auspices, and

(b) the requirement in the PP dated September 30, 1975 that the Project not be continued for funding beyond FY78 without resubmission of the Project to the Administrator for review and approval.

The evaluation team found that certain of the above sub-projects were doing well and, in substance, should be continued; however, the team also concluded that the original EAAFRO project viewed in its entirety, was too compartmentalized and insufficiently attuned to the need for research oriented to the small-holders' needs and that it failed to stress delivery of research results to the small-holder. To quote the evaluation:

"In the opinion of the Team, activities carried out on a regional basis, as under EAAFRO, often may justifiably be devoted primarily to basic research, whereas country specific research projects should have greater practical application. The original project proposal made no significant reference to

recipients or a target group. The basic thrust was to conduct research in specific areas and to develop research methodology as well as specific research capabilities within the cooperating organization."

USAID/Kenya, the GOK and UNDP/FAO based on their findings, have agreed to redirect the project as outlined in this document. Attractive elements in the current Project will be retained while areas of weakness - such as project integration and communication with the small-holder beneficiary - will be addressed and remedied.

Details of Proposed New Project

It should be stressed first that what is now proposed is AID funding for a component part of a program aimed at -

(a) the conducting of research relevant to Kenya's dry-lands small-holders - initially in the Machakos and Kitui area and, potentially, to other areas later; and

(b) the delivery of the results of that research to those small-holders.

The concept is that, within this program, there would be discrete but closely interrelated projects, namely:

(a) the furnishing by AID of (1) Seven technicians to be stationed at Muguga and Kitale under a 5-year USDA/PASA Agreement, (2) significant training of Kenyans, (3) limited commodity support and (4) certain project-related training and commodities for the Protein Quality Laboratory at Kitale; and

(b) the furnishing by FAO of eight technicians at Katumani for the same period, also with appropriate levels of training and commodities.

The semi-arid lands research conducted by the AID and FAO technicians would be closely coordinated; with the FAO team in particular being made fully cognizant of the need to work with the Kenyan extension service on the "delivery" aspects of the program. A prime program objective and expectation is that Kenya will itself - through the program's training component - have developed the institutional capability within five years to manage this program on an independent basis and, indeed, to expand its scope to include marginal rainfall areas additional to the initial target areas of Machakos and Kitui Districts.

More specifically as to the proposed new program, AID and FAO will furnish the following personnel, each to have at least one GOK counterpart. The GOK is also to furnish rural sociologists, on both a full and part time basis, to work with the FAO team.

AID [1/]	FAO
-- Senior Maize Breeder	-- Project Manager/Soil-Water Management Specialist
-- Maize Breeder	-- Agronomist (2)
-- Agrometeorologist	-- Plant Breeder (2)
-- Agronomist	-- Animal Nutritionist
-- Plant Pathologist	-- Pest Control Specialist
-- Soil Physicist	-- Farm Management Research Economist
-- Agricultural Economist	

Scope of work for each of these positions is found in Appendix X. As mentioned, it is the intention, through mounting of the two activities (AID's and FAO's) to develop a program which would build and improve upon the current EAFCR Project. Specifically, and with reference to particular points of constructive criticism made by the EAFCR Project's recent professional scientist/evaluators:

1. As indicated above, the EAFCR marginal rainfall crops systems sub-project is currently developing essential agro-economic information that will be incorporated into a technological package of recommendations regarding appropriate crop varieties, cropping systems, planting times and cultural practices, which when adopted by the target group can significantly improve their agricultural productivity. Research under this sub-project will focus on food crops appropriate to marginal rainfall areas. Research on non-food crops is conducted at other research stations. In developing optimal crops systems for the marginal rainfall areas however non-food crops will be evaluated and tested as potential elements of the recommended crop systems. Specialties considered essential under the current Project would be continued.[2/]

1/ The Team Leader will be nominated by the USDA for Mission and GOK concurrence.

2/ These are three research scientists in the fields of agricultural economics, agrometeorology and agronomy. They are assigned to the Kenya Agricultural Research Institute (KARI) at Muguga (formerly part of EAAFRO) and conduct their field work at the Ministry of Agriculture (MOA) research stations at Katumani in Machakos District and Kampi ya Mawe in Kitui District.

Furthermore, the proposal recommends that the existing USDA team's research activity be directly linked with the FAO Dryland Farming project activity to be launched concurrently with the new AID-funded activity. Thus, the proposed USAID research effort, combined with the FAO Drylands activity, will include all essential research elements required to develop and, through the GOK's Extension Service, to deliver a technological package of recommendations for improved agricultural productivity by small-holders in marginal rainfall areas. Research information acquired during the brief period that the marginal rainfall crop systems sub-project has been in existence (about one year) has shown that such an intensified research effort is warranted. The increased emphasis being placed by the GOK on improving the conditions of small farmers in the marginal rainfall areas is highly suggestive of greater Government support for this class of beneficiary. Other GOK organizations, such as the Faculty of Agriculture of the University of Nairobi, are beginning to develop information relevant to the drylands. The FAO Drylands project will call for extensive utilization of field trials and the development of a pre-extension agronomic testing system which will greatly increase prospects that appropriate technological recommendations will be developed for adoption by the target group of small farmers.

2. Evaluation of the EAFCR maize breeding sub-project has confirmed that an intensified plant breeding program which could develop improved varieties of maize for the lower rainfall areas is needed. The expanded breeding program would build on the many years of maize breeding research supported by USAID at the Kitale Research Station; would utilize those breeding materials developed; and would draw upon Kenyan maize breeders trained under that successful program.

3. Increased attention to the problem of crop diseases will be initiated and practical control methods developed either through resistant varieties, improved cultural practices, or a combination of both, which can be included in a technological package for the Dryland areas. Present efforts of the PASA Plant Virologist will serve as a useful starting point for this intensified effort. The Virologist has made several significant discoveries relating to two major maize diseases and has identified promising resistant strains that could be incorporated into the proposed new maize breeding.

4. The research in agrometeorology is to be continued with greater emphasis placed on research that has direct application to the agronomic problems of the target group. The proposed new program will continue these activities and will stress the close working relationship which must be maintained between the agrometeorologist and other AID-funded scientists working under the revised program and the FAO Dryland team,

43

to insure that the results of the agrometeorologist's activities have a greater developmental impact on the program as a whole.

5. The evaluation report indicates that the work in socio-economics must be intensified and must be closely related to existing conditions found in the target area if improved technological packages, adaptable to the needs of the target group, are to be developed. It is recommended that the actual socio-economic conditions of the target group be studied in-depth in addition to analyzing available relevant data. The need for establishing operational linkages with the district extension workers, and for increasing the utilization by researchers of rural sociology information, available from the University of Nairobi, is also recognized. To these ends, the GOK as part of its program contribution will furnish the services of a rural sociologist(s) to meet the requirements of the project. As project work is initiated, the data base will be considered and the desired level of sociological input will be determined. In this regard, both project teams will review requirements periodically and recommend to Government the levels needed to meet the requirements of the project.

6. Additionally, a Farming Systems Specialist will be assigned to the program. This specialist would have a background in farm management and a working knowledge of agricultural extension systems for both crop and livestock production as they relate to small-holders. To address the need for this type of expertise, FAO will provide under its Drylands Farming Research Project a full-time agricultural specialist (farm management economist) who will work with Kenyan counterparts in the fields of agricultural economics, rural sociology and agricultural systems development; information relating to socio-economic conditions[1/] will be made available to the USAID team by this FAO technician. Further, this FAO-funded technician will assist in providing the linkages between the technical research workers and primary beneficiaries - the small-holders in the marginal rainfall areas - by closely collaborating and cooperating with the GOK extension service and other appropriate agencies to enhance and improve the delivery system relevant to technological packages as these are jointly developed by USAID and FAO.[2/]

1/ e.g., crops and/or livestock presently grown; average yields, market systems and prices; farm income; resource requirements; labor availability and distribution by sex and age groups; the role of women, off farm per capita income; land tenure practices; family groups; social and cultural values; and common agricultural practices of the area, etc.

2/ FAO's emphasis through the extension service will be on "two-way" communication: both determining small-holders' wishes and needs so that research can be adapted accordingly; and then communicating to small-holders the results of that research.

Specific Technical Assistance Proposed for AID Funding

While Appendix X contains a scope of work for each scientist (both AID and FAO funded), a summary of the prime areas for AID funding, with supporting rationale, seems appropriate. These are:

1. Soils Science/Soils Physics

The proposed new USAID project in collaboration with FAO Drylands Research Project will develop an integrated approach to solving the problems of agricultural production in the marginal rainfall areas. The climatic constraints involving rainfall, evaporation, water holding capacity of the soils, and moisture requirements for different crops and varieties will be determined. The physical characteristics of the soils will be studied and recommendations will be incorporated into the final technological package developed for the target areas. The MOA has adequate facilities and technically trained people to carry out the mechanical aspects of the soil research work at the National Agricultural Laboratory (NAL). At least one scientist from this institution will be assigned to this project, and will work in close cooperation with the personnel described below.

The whole topic of soil and moisture conservation has to be given major attention as agricultural systems are developed in the lesser rainfall regions of the country. A soils physicist with practical working knowledge of soil and water conservation will, therefore, be a part of the AID-funded team. This individual will develop information on rainfall acceptance of different soil types and study the effects of various tillage practices on water infiltration rates and moisture retention. He[1/] will also collaborate with the agronomist and the agrometeorologist and the FAO soil management conservation specialist in developing appropriate experimental tracts and field plots.

2. Maize Breeding

Maize is the principal food crop of Kenya, and deserves special attention under this new AID-funded project. Two maize breeding specialists will, therefore, be assigned to KARI at Muguga to provide assistance to maize breeders in all areas of the country but with greater emphasis on the work being done on varieties for the lower rainfall areas. They will work closely with the Kenyan maize breeders and with the FAO Entomologist and USAID Plant Pathologist to be available under this project. An attempt will be made to breed improved

1/ The masculine pronoun is used throughout this paper for convenience only. Qualified female nominees for any or all positions would of course receive equal consideration.

maize varieties, with higher protein content,[1/] that are not only more tolerant of the drought conditions but also resistant to diseases prevalent in the lower rainfall areas. These scientists will coordinate with their FAO counterparts all of the maize breeding activities being carried out in the country at the Research Stations in Kitale, Embu, Katumani and Coastal areas.

3. Agronomy

The agronomist assigned to this project will study the present farming systems and potential crop systems. He will evaluate crops, varieties and farming practices that have evolved from experiences gained by the farmers. Special attention will be given to the mixed cropping system that usually combines several crops, including two or three different legumes, in the same production area. He will work closely with the scientists at the University of Nairobi who have been emphasizing the production of edible legumes with special attention to pigeon and cow peas; and will select in consultation with FAO, the most desirable crops and varieties for inclusion in the FAO conducted field trials. Also, the agronomist will do research on edible legumes and cereal production and investigate the significance of mixed cropping practices that are a major part of agriculture as presently practiced in the area.

The agronomist will collaborate and coordinate his activities with University of Nairobi scientists having similar interests. These specialists will work closely with the soil scientists who will determine the chemical and physical properties of the soil, and with the agrometeorologist who will investigate the water regimes of the soil and crops and determine minimal crop water requirements for optimal plant growth. A joint effort will be developed to determine the best varieties, crops and agricultural practices that will insure the most economic production, considering the soil and climatic situations.

4. Agrometeorology

The project area, because of steep slopes, poorly drained soil types and occasionally very intensive rainfall, is subject to serious soil erosion that will become more critical as agricultural production in the region is intensified. The marginal rainfall areas have a history of traditional soil conservation practices that will be examined by the AID-funded agrometeorologist in collaboration with Kenyan scientists and specialists and modified to improve overall conservation methods, water infiltration and rainfall acceptance. In this regard, the agrometeorologist will take the lead in gathering basic information

1/ The PQL at Kitale will assist in this effort by testing, and selecting for breeding trials, promising varieties that have superior protein quality characteristics.

regarding water holding capacity of soils and crop water requirements. Information regarding rainfall, evaporation rates, soil moisture content and varietal differences are required by the agronomist and plant breeders. This information is presently being developed by an agrometeorologist under the AID/USDA/PASA. Emphasis will be placed on obtaining information that has practical application for plant breeders, agronomists and the final recipient - the small farmer.

5. Plant Pathology

The Plant Pathologist, working with his Kenyan counterparts and with an FAO-funded entomologist, will identify the principal crop diseases prevalent in the target area and other sections of the country; control of these diseases is critical not only to maize production but to other food crops commonly grown and to be introduced in the future. Special consideration will be given to plant diseases that may appear in the target area as production is intensified. This scientist will not only work with the plant breeder to help breed resistant varieties but will also examine the present cultural practices of the small farfarmers and recommend changes to prevent diseases from carrying over from one growing season to the next.

6. Agricultural Economics

At the present time there is no Agricultural Economics Division at KARI. The Director of KARI and The Scientific Research Division of the Ministry of Agriculture have identified a need for a separate Division of Agricultural Economics at the station. The agricultural economists in the new division will work with the scientists of all other divisions helping them evaluate the economics of the projects. Since the major effort of the GOK and KARI is to be focused on the dryland areas, it is anticipated that the thrust of the work and train- of personnel in this division will complement this priority. The work will include (a) collecting relevant input-output data for each project, (b) analysis of the data in terms of developing functional relationships between physical outputs and relevant economic inputs, (c) work with the scientists in developing experiments, (d) work with the scientists in making recommendations to the extension staff, and (e) in cooperation with the other scientists make suggestions for further work.

7. Other

In addition to the various activities described above that should be initiated or intensified, one other important on-going sub-project deserves the continued support of AID. This is the Regional Protein Quality Laboratory at Kitale. Direct USAID support to this facility[1/]

1/ USAID financed start-up laboratory/office equipment and required supplies and chemicals.

was prematurely terminated when the PASA technician assigned to the activity returned to the U.S. in December 1977 after completing only 14 months of a planned 4 year assignment. The scheduled academic training of the two Kenyan technicians - necessary to enable them to take over responsibility for the operation of the PQL - has not been completed. Specifically, each counterpart was scheduled to receive 12 months of U.S. technical training at Purdue University in addition to 3 months training at CIMMYT in Mexico. Only one technician has completed the CIMMYT course.

Further, critical items of laboratory equipment including an ultra-violet spectrophotometer, which is used in many routine protein analysis procedures, have not been purchased and are urgently needed if operational efficiencyof the laboratory is to be maintained. In addition some consumable commodities, i.e., laboratory glassware and chemicals, are required to continue the work of the PQL. In spite of these obstacles, the Kenyan technicians at the PQL have performed commendably since the departure of the last PASA technician. They are prepared to provide, and have the potential for providing, expanded service to the plant breeders if the PQL receives the necessary support (training and equipment) proposed. Continued support of this laboratory, through modest training and equipment, is of direct relevance to the work to be done at Muguga and should be given under this expanded project. Some equipment items have been identified to insure effective operation and additional training of Kenyans is also indicated. Some TDY assistance may be required which can be furnished under the PASA agreement.

It should also be noted that the Plant Quarantine Station Officer funded by AID under other documentation, is another key person with whom the new AID team should coordinate. The importance of that facility is discussed on page 12 above.

Equipment and Commodities for AID Funding

In order to make the project operationally effective USAID will provide various items of agricultural equipment, vehicles and supplies estimated in total at $571,000. These are detailed in Appendix VIII. FAO will provide similar items for its component project in the program, estimated in total at $200,000.

The operation of the AID-funded project will depend to a larger part on the timely delivery of many of these items. Maximum effort by the team leader and USAID will be required in the early stages of the project to make the purchases in an orderly and timely fashion. The USDA will be responsible for procurement arrangements and implementation.

A U.S. source waiver is requested to permit purchase in Kenya of 7 European source vehicles for the project, at an estimated cost of $95,000. Detailed justification is presented in Appendix XIII.

Agricultural equipment and the laboratory items proposed for purchase are identified in Appendix VIII. These are required to carry out essential research activities for the project as well as to supplement existing equipment in the Protein Quality Laboratory at Kitale. Consumable items such as chemicals will be purchased at the start of the project by USAID; later requirements will be part of the GOK contribution. Some of the equipment presently being used by the agrometeorologist is highly technical and cannot be repaired in Kenya. The PP recommends a special line item in the budget for air freight and repair in the United States. However, on-the-job training in electronics equipment maintenance and in-country short courses in electronics are proposed which will increase the Kenyans' capability to maintain the scientific equipment.

A small desk top computer was purchased for the former EAAFRO maize breeding program. This is not presently being utilized due to lack of technical capability in Kenya to effect necessary repairs.1/ Further, this computer is inadequate for complicated problems and lacks storage capacity. The proposal, therefore, is to purchase a Hewlet-Packard 9845A with accessories as described in Appendix VIII at an estimated cost of $50,000. This computer would be supplemented with appropriate hand-held calculators as discussed in the appendix.

Finally, it is hoped that all items shown in Appendix VIII for U.S. source procurement can in fact be purchased in the U.S. in timely fashion. Experience shows, however, that it is highly unlikely this will turn out to be the fact. Therefore, on a case-by-case basis,

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1/ A TDY electronics specialist should shortly be addressing this and other equipment maintenance/repair problems under the current project. Additionally, the USAID Agricultural Economist assigned to KARI will initiate an on-the-job computer operation/maintenance program for the KARI technicians; this should insure optimal utilization of the new equipment.

49

USAID/Kenya will consider waiver of the U.S. source requirement to permit local purchase of critically needed items, from any "Free World" source, based on a showing that U.S. supplies are unavailable for delivery within the time required to meet project objectives. It is estimated that perhaps $40,000 of project funds would be used for such non-U.S. source purchases.

Training of Kenyans

Training of Kenyan technicians and development of Kenyan capability to carry out relevant activities at the termination of this project are of prime importance and are, therefore, treated in this PP at considerable length. Training will be initiated in Kenya through project-supported seminars and short training courses as well as through project supported advanced degree training at the Faculty of Agriculture of the University of Nairobi. These students will work on the project and their research will be project related. Training in the United States will be of varying types and durations and will be directly coordinated by the PASA Team Leader.

It is impractical at this time to develop special estimates of training numbers and funding requirements by fiscal year. However, as a condition precedent to the availability of project funds for training purposes, the GOK will submit to USAID/Kenya a life-of-project training plan which will also indicate the source of Kenyan manpower to qualify for this training. This PP, drawing on the April 1978 review team findings and the ATAC manpower study (ref. 3), recommends an allocation of $1,179,200 which would fund approximately 8 Kenyans to the BS, 14 to the MSc, 4 to the PhD level at U.S. institutions and 5 Kenyans to the MSc level at Kenyan institutions[1/], plus limited non-degree programs and certain local seminars. Attendance at selected meetings of various international organizations such as ICRISAT, CIAT, IITA, etc., will be considered essential and will be recommended by the team leader to USAID for approval. In addition, permanent linkages with these international organizations will be developed. FAO will be funding similar training relevant to the needs of the Katumani Station.

As pointed out in the ATAC manpower study, the supply of university and technically trained personnel within the agricultural sector of Kenya is limited. This situation is recognized and this project will attempt to alleviate the problem by providing training, as indicated.

1/ All training to the degree level is based on current estimates of future needs at KARI, Muguga, and allows for some inevitable attrition. These figures are subject to reconsideration once the U.S. scientists are in place.

However, to obtain acceptable results from this project and to establish a continuation of activities, a nucleus of trained Kenyans will have to be assigned to this activity from its inception. Major emphasis will be placed on developing activities that will provide meaningful practical information during the life of the project. At the same time, priority attention will be given to providing the framework within which the project will be continued after the end of USAID participation. (Note: FAO is taking a similar approach as to training).

Project-funded training will be at all levels. This will include in-service training in work-oriented situations as well as professional development within the country. However, as pointed out in the ATAC manpower study, such possibilities are limited, so that training abroad will be an integral part of this project. Several different approaches are indicated. As mentioned above, organized in-country training by the permanent team members and those provided on TDY will be expected. People requiring specific training to acquire certain skills will be sent for special technical training to the U.S. and other countries. Travel and study grants for short visits to national and international institutions and for attendance at professional conferences is recognized as necessary to continued professional development. This type of learning experience will be encouraged under this project.

The need for a different type of training is indicated in the ATAC manpower study. There are not enough agricultural graduates being produced at the University of Nairobi to satisfy the needs of the country. However, experience has shown that graduates from Egerton and other colleges with diplomas can be trained to the BSc level at U.S. institutions in two years. Similar training in Kenya requires at least three years but enrollment is curtailed because of space and faculty limitations. This project will encourage the MOA to obtain for the project an increased number of Egerton graduates with an interest in research.[1/] The best of these technicians will be selected for the BSc training in the U.S. after a satisfactory probationary period of working as part of the research team. After receiving the initial degree, these graduates will return to Kenya and be reincorporated into the project. At a later time, they would be eligible for further training at an advanced degree level.

1/ In this and other respects, this project will complement the FY78 AID/GOK Agricultural Systems Support Project, one component of which will finance a major expansion of Egerton College. Another ASSP component will finance MOA training opportunities; ASSP training funds can, in USAID's estimate, easily be absorbed for MOA training needs independent of the Muguga Stations' requirements.

51

The last type of training to be supported by the project will be the traditional advanced degree training. All candidates for this type of training will have served as counterparts to members of the research team. They will follow recommended course of study and will be expected to return to the project. Their research work and dissertations should be project related. It is expected that a majority of the degree candidates will study at U.S. universities and their major advisors will be knowledgeable about the project. In addition, USDA will prepare a special program of study for the Egerton graduates, whose numbers should be sufficient to make such a program cost-effective. All participants selected for training at any of the levels described above will be approved jointly by the Director of KARI and the U.S. team leader and all training, generally, will be within the scope of training plans to be prepared by the team leader.

In the past, the retention of trained Kenyan agricultural scientists has been a chronic Government problem, primarily because demand for such scientists is strong in the private sector and the GOK's Scheme of Service (levels of staff compensation) are frequently noncompetitive. We now anticipate that KARI will be established as a semiautonomous corporate research entity with an improved staff salary schedule that will measurably increase KARI's attractiveness to the career Kenyan scientist. (The Science and Technology Amendment Bill 1979, which will incorporate KARI when enacted, has been submitted to Parliament and passage appears imminent.) USAID, as a project Condition Precedent, will, however, request the GOK to submit a statement that outlines Government's longer term plans for addressing the staff retention problem.

III. POLICY AND PROGRAMMATIC RATIONALE

Importance of Project

This project will help achieve agricultural sector goals of Kenya both directly and indirectly: Directly, by obtaining critical agronomic information which can assist in solving the agricultural production problems of the marginal rainfall areas; and indirectly, by strengthening the research capability of the MOA. One of the principal sector goals of the GOK is to assure self-sufficiency in food production. Achievement of this goal will mean that the smaller and poorer farmer has improved his agricultural production and increased his economic return. Special attention is being given in this regard to the farmers in the marginal rainfall areas by the GOK. A major consideration for the future is to attempt to even out food production so that famine years do not occur as a result of lower than normal rainfall. This project will make a major contribution toward these objectives.

Agriculture provides 85-90 percent of the employment in Kenya. Improvement in this sector will not only increase the GDP but will provide continued economic and political stability. The improved use of the marginal lands with a proper mix of crop and animal production will promote efficient internal migration and help minimize underemployment and unemployment, while assuring an adequate food supply for the country.

The 1974-78 Government of Kenya Development Plan states that: "High priority is given to agricultural research in order to develop varieties of crops and livestock and more efficient production techniques). The Ministry of Agriculture budget for 1977/78 allocated $9.4 million to the Division of Agricultural Research or about 7.8 percent of the total Ministry budget (ref. 3). This research project will directly support the above stated priority.

In addition to developing improved varieties of crops for the marginal rainfall areas, a major stimulus will be provided for the development of KARI at Muguga and for the Katumani Dryland Agriculture Research Station. All the laboratory and basic research work will be done at the Muguga station with the field trials being carried out mainly at Katumani and other sub-stations, such as Kampi ya Mawe, in cooperation with the FAO team members.

57

Relationship to Other USAID/Kenya Projects

This proposed project will be closely related to other USAID projects such as: The Marginal/Semi-Arid Lands Study (Ref. 1); and the recently signed Agricultural Support Systems Project (ASSP). The former will provide useful baseline data and identify priority activities that could be researched under the new project; while the latter will provide useful resources support to the new program.

Several components of ASSP will be of importance to the proposed new project. The Range Research component of ASSP and the Crops Research aspect of the new program will complement each other. The soil physicist and agrometeorologist will collaborate and assist the Engineering and Hydrology Advisor of the Range Research under ASSP on water and land uses, and vice versa. Similarly, the Plant Material Advisor under ASSP and the plant breeder and agronomist under systems for the Marginal Rainfall Areas. Furthermore, KARI's research capabilities to combat problems in the MRAs will be developed through this project; since KARI addresses both agricultural and livestock production problems, there will be cooperation and collaboration between the Range Research component of ASSP and the Crops Research aspect of the new program.

The proposed ASSP project will provide assistance for increasing the agricultural training capacity of Kenya which will increase the number of trained extension staff. The training components of the new program are designed to incorporate some of the trained Egerton graduates and other (e.g., University of Nairobi) students into an advanced training program (e.g., Egerton graduates to the BS level, and University of Nairobi graduates to the MSc and PhD levels) to meet specific needs of the research project. Therefore, ASSP's training program will complement the training program of the new program. Furthermore, ASSP's plan to replace the present lower level extension staff with Egerton graduates will also assist the new program in its collaborative effort, between MOA's extension service and the GOK's Integrated Agricultural Development Program (IADP), to prepare an effective delivery system for implementing research findings. Under the new program, the research team will develop a technological package, but the extension service will have the ultimate responsibility of delivering that package to the target group.

In addition, the proposal to assist the Faculty of Agriculture at the University of Nairobi will also be beneficial to all research efforts in the country. ASSP will complement the World Bank's program

to increase enrollment from 300 to 805 students. This two-phase program, consisting of academic and feasibility studies to be followed by a construction and teaching staff-development stage, will significantly increase the number of university graduates available for research projects in general. It is also anticipated that the staff-development aspect should provide graduates with greater ability to cope with research problems.

The support to be given under the ASSP proposal to the Agricultural Finance Corporation (AFC), the Ministry of Cooperative Development (MOCD) and support to improved grain and marketing systems will also be useful to the new program's objectives. Improved technology usually requires greater inputs. In the case of the small subsistence farmers, who comprise the target group, this usually means a source of adequate and equitable credit. In addition, the presence of a strong and viable cooperative system assures a source of required inputs and a purchaser for the products produced. Storage, both on the farm and at intermediate collection points, is to be addressed under ASSP and is an essential element to any agricultural development program.

In summary, the new program will benefit from all the present and future USAID/Kenya activities outlined above.

Other Donors' Activities

There will, as shown above, be close coordination between the project and the recently developed FAO Project on Dryland Farming Research and Development; in fact, the two projects will provide a comprehensive program.[1/] Details of the FAO project are as shown in ref. 4. In essence, the FAO proposes to furnish 38 man-years of technical assistance over five years. This FAO project, with a total budget of $3,650,000, will be located at the Katumani Station, which is the principal area of field research under the existing Food Crops Research Project and which will to all appearances remain so. New laboratories, offices and housing will be constructed at the Station. The USAID Project will be physically located at Muguga where the complementary facilities of KARI will be available.

The FAO project will work in the areas of sorghum breeding, animal nutrition, economics, and rural sociology, general agronomy and farming systems agronomy. The specialist in these areas will actually be located at Katumani and work directly with the personnel of that station.

1/ One mechanism for this coordination will be the Technical Co-ordination Committee, sited in UNDP/FAO Project Paper, pages 46-48, of which USAID is a representative participant.

55

Discussions with the Directorof Research of the MOA, the Directors of KARI and Katumani, and with the country representative of FAO, have clearly established the acceptability and desirability of a joint approach. UNDP funding is understood to be available for this activity. It is agreed that a memorandum of understanding dealing, among other things, with contributions of each of the three parties (i.e. GOK, USAID, FAO) to the joint project will be developed as a condition precedent to disbursement of the AID contribution to this project.

IV. IMPLEMENTATION SCHEDULE, RESPONSIBILITIES AND PLANS

Length of Project

Here, as in true of most research activities, a program of five years is considered as being the minimum required to develop this activity to the point where it is reasonble to expect the host government to be able to carry it alone. More specifically, it is difficult in any project of this nature to establish a definite start up time when the project proposal is being drafted. The inherent nature of the GOK/USAID approval process as well as the AID/W review can cause unexpected delays. The selection of scientists to provide the services and the security clearance process can take vaying lengths of time. The references to project implementation cited above have established an optimistic or "under best of conditions" time schedule. Thus, five year authorization is requested both because research per se is inherently a long-term proposition and also because experience shows that those best of conditions seldom exist.1/

Under the heading "Evaluation Arrangements", below, a method is described to review the project 18 months before the scheduled termination. This review will determine manpower requirements during the final phase of the project based upon accomplishments as of that time.

It is also felt the training effort should be extended over a five year period and, indeed, high quality training is critical to accomplishment of a self-standing Kenyan institute within only five years. As discussed, all candidates for training should have proven work experience with the project before being chosen for training support. In the case of the Egerton graduates who will be candidates for the BSc in the United States, thus requiring two years of training, they would have to be selected no later than the third year of the project in order to return before project completion. This participation in the activities of the project before being selected for training will also apply to those selected for advanced degree work.

For the above reasons, it is believed that the five year project schedule is realistic in meeting the final goals and objectives.

1/ For example, most scientific personnel are committed to teaching or research assignments several months in advance. It is felt that the research effort should go forward with the majority of the team members at the same time. For most specialists this will mean two tours of duty of two years each or replacement at the end of the first tour by someone in the same field.

The present USDA Research Virologist will be replaced, under this new program, at the end of tour of duty in February 1979 by a scientist having a background in the whole spectrum of plant diseases, (i.e., a plant pathologist). The vacancy in the present program for a plant (maize) breeder will be filled with a person capable of working with the various maize breeders in the country. The Agricultural Economist position will be continued with an expanded scope of work to establish an Agricultural Economics Division at KARI. The scientist who was recruited as a sugarcane agronomist will be replaced by a general agronomist at the end of the present tour of duty. The present positions of electronics specialist and biochemist are to be eliminated in the future program. It will be necessary under the present PASA to furnish an electronics technician on a TDY basis.

Assuming early project approval and prompt contract negotiations, it would be possible to field the first members of the proposed research team in mid-CY 1979. The present and future staffing follows:

Present USDA/PASA Team	Departure Date
1. Plant Pathologist (Quarantine Station)	02/81 (will not be replaced) (This position is fully funded under existing E.A. Food Crops Project 618-657)
2. Plant Pathologist (Virology)	02/79 (to be replaced)
3. Agricultural Economist	08/79 (to continue)
4. Agrometeorologist	10/79 (to continue)
5. Sugarcane Agronomist (now functioning as an agronomist)	04/79 (to be replaced)

Future USDA/PASA Team Position	Possible Arrival Date
1. Senior Plant Breeder Maize	08/79
2. Plant Breeder Maize	08/79
3. Soil Physicist	08/79
4. Plant Pathologist	08/79
5. Agronomist	08/79
6. Agrometeorologist*	at post
7. Agricultural Economist*	at post

*Positions in present PASA to be continued

Project Coordination

The USAID research team will be coordinated and directed by the designated Team Leader who will have broad knowledge and experience in the multi-disciplinary approach to solving agricultural production problems[1/]. He will work closely with the FAO Team Leader and the Kenya Agriculture Research Institute at Muguga and coordinate the USAID team's efforts through that Director and other appropriate MOA officials. The Team Leader will be concerned with utilizing the technical expertise existing in the country and insuring that the research team effectively utilizes MOA counterparts. He will promote the success of the project by timely employment of TDY assistance when the need arises. He will have to view the research project - and the broader program - as one combining all available knowledge from Kenya and other countries into a technological package meaningful to the recipients.

Training and Related Activities

Annual training plans will be developed by the USDA/PASA leader in consultation with GOK, FAO and USAID. Training at U.S. institutions will be implemented by a U.S. university contractor, as opposed to use of the AID participant training mechanism.

In-country participation in educational activities will also be arranged by the team leader. He will be expected in this regard to develop close contacts with the Faculty of Agriculture at the University of Nairobi as well as with other relevant departments of that institution. Also, members of the team will be encouraged to give occasional lectures in their areas of competence at the University, and to take an active role in working with graduate students who may be assigned to the project. The team leader will utilize both TDY and permanent personnel in organizing seminars within the local academic and professional community. These seminars will be organized in cooperation with the Director of KARI, FAO and appropriate university professors. Seminars should be planned and scheduled well in advance and conducted in such a manner as to enhance the reputation of KARI and to advance the program's objective of a coordinated approach to solving the problems of dryland agriculture.

All scientist to be furnished under the project will provide "on-the-job training" to Kenyan counterparts. The MOA will assign personnel to the project as required.

1/ The PASA will fund the services of a qualified administrative assistant, thus permitting the Team Leader to concentrate on substance and coordination.

59

Research Plans

All members of the AID-funded USDA/PASA team will be required to develop specific research plans within 90 days of their arrival at post. These will be coordinated with FAO and reviewed and approved by the designated team leader, the Director of KARI, and the USAID Project Manager. These research plans will be updated on an annual basis and will become a part of the annual report to be prepared by the contractor's representative for USAID/Kenya. All research should be oriented toward producing practical recommendations that can be incorporated into minimal risk technological packages to be developed in cooperation with the FAO team.

A definite research plan or proposed plan of work for each specialist is not prepared in this PP because the development of each work plan is predicated on the cropping season, i.e., long rains or short rains, that is underway when the technicians arrive in Kenya, as well as on the amount of precipitation received at the research sites in that particular year. Since the arrival time of the various team members and an accurate forecast of precipitation levels at the research sites can only roughly be estimated, development of tentative plans of work for specialists at the time would not be realistic. Further, the proposed specialists who will continue the work initiated by the current PASA scientists will have to formulate their research activities in relationship to the achievements attained by the current project technicians. Because it is impossible to predict with any precision the magnitude of research achievement attained at a given point in time by each PASA scientist, work plans for the scientists cannot be realistically drafted until after the arrival in country of these specialists.

V. EVALUATION ARRANGEMENTS

Evaluation will be a continuing process during the life of the AID-funded project. This will include evaluating progress made toward on-going program as well as efficiency of the operation. A recognition of the need for evaluation, the organizations responsible, and dates for implementation of the evaluation are outline in this Project Paper. Since that project is merely part of an important program, focus of joint FAO/USAID evaluations will be on accomplishment not only of AID's project but also of program objectives, namely the promotion of communication between small-holders and researchers and the delivery to the former of the results of adaptive research. AID's particular interest will be met by a more AID-specific series of evaluations.

Proposed evaluations are, more particularly, as follows:

(a) Annual USAID/GOK Evaluations

The MOA of the GOK will participate with USAID in an annual review of the project. The Director of Research in the MOA will either participate or appoint a representative, who will be joined in the review by representatives appointed by the USDA and a representative appointed by USAID/Kenya. They will review the project in the context of the objectives agreed upon in the project documentation by GOK and USAID, establish evaluation criteria, and make appropriate recommendations where necessary to overcome any difficulties encountered. FAO would be invited to participate in these evaluations.

As an aid in these evaluations, each AID-funded technician will develop an initial work plan, which may be revised prior to the beginning of each year in consultation with members of the research team, division heads, the team leader and the Director of KARI, and will write a progress report at the end of each year. These will be submitted to the team leader who will combine them in a project report for use by the above-identified review team. This review team will make any necessary recommendations concerning the present and future activities in their report. The annual report to USAID/Kenya will be the responsibility of the team leader. This report will include not only a detailed narrative of the research project progress and identification of problems in the technical area, but also strategies for resolving those problems identified; a complete financial accounting; and problems (if any) encountered in the expenditure of funds and the allocation and

distribution of resources. The yearly report is to be prepared in accordance with the most recent USAID guidelines for such reports. Also annual reports of the team leader and technicans will form a data base for determining progress toward goals, purpose, output, input needs, etc. These, along with the reports of the annual cooperative review team (USAID,GOK, USDA), will form a continuing report of progress that will be available to both the U.S. and Kenyan Governments.

In addition to these annual evaluations, the project will be subject to audit in accordance with normal AID procedures and scheduling.

(b) External Evaluations

Eighteen months following the arrival of the last program technician in Kenya (whether AID or FAO funded) an outside team of experts will be engaged by AID to work with Kenyan experts, appointed by the Director of Research in the Kenyan MOA, to review the impact of the overall program on the target group in Kenya. Specifically, this team will review with FAO and USAID-funded technicians the degree to which small-holders, through the Extension Service or otherwise, are communicating with the AID and FAO funded researchers and the degree to which those researchers are directing their work toward perceived needs of this beneficiary group. The team will identify problems, if any, in this regard and make appropriate recommendations. The team will also indicate the extent to which program objectives are being achieved as of that date. Eighteen months after completion of this first external evaluation, a second such evaluation will be held, this one implemented through FAO's contracting procedures. Focus of this second evaluation will be expanded to include:

(1) effectiveness of the Kenyan Extension Service in delivering the benefits of USAID and FAO funded adaptive research to the small-holder; and

(2) progress toward ultimate Kenyanization of the program.

Following program completion - i.e., departure of the last technician from Kenya - final and comprehensive evaluation will be held, subject to procedures to be agreed among the parties (USAID, FAO, GOK).

Suggested funding of external evaluations might be as follows:

(1) USAID to pay costs of first;

(2) FAO of second;

(3) USAID and FAO to share costs of final, one-half each.

As to data for external evaluations, no initial baseline survey is believed critical since it is known that little if any communication now takes place from small-holder to research; virtually any positive findings can be considered attributable to the new program. As to other economic/social data, a minimum of baseline data is available for the target area. The best available data are referred to in this PP as the preliminary report of the CID Team (ref. 1), but the CID final report should be available by the time the FAO and USAID teams are in the field. One of the priority responsibilities of the FAO funded Agricultural Economist will be the development of more specific and useful baseline data for the project area.

63

VI Financial Plan

AID will contribute $6,000,000 to the project and the GOK will contribute $3,200,035 to direct project support. In addition FAO will provide $3,650,370 to the overall program with the GOK providing an additional $4,165,297 for FAO support. Details are shown in Appendix VIII and the AID contribution is summarized below as:

Personnel Costs	$3,972,000
Participant Training	1,179,000
Travel and Per Diem	78,000
Equipment	511,000
Expendable Supplies	60,000
Project Evaluation	200,000
	$6,000,000

AID cost estimates are based on recent project experience in Kenya and current PASA agreements with USDA in the ongoing project. Inflation and contingency factors are those being used in USAID/K projects to assure sufficient funding for unexpected expenses in periods of rising costs.

The GOK will contribute toward a variety of project support costs. Staff will be released for training on continued salaries plus payment by the GOK of one-way international transportation. The GOK will also be adding staff, which entails a financial commitment (salaries), in order to furnish counterparts for the conduct of the program. In addition, technical support and labor needed to backstop the project will be supplied by the GOK. These staff, labor and other costs are to be contributed to the AID project at an estimated cost of $2,996,410.

As to material inputs from the GOK, these are essential to the success of the project and also involve a sizable financial commitment. Land for field experiments, laboratories, greenhouses and offices will be provided by the GOK at an estimated cost of $95,570. Equipment in the amount of $38,255 will be provided by GOK to carry out the proposed research. Some of this is available in Kenya, but some will have to be imported. The Governments will jointly support this need with the GOK making available certain existing equipment and the USAID covering most of the costs of new equipment. Consumable supplies costing $969,800 are needed as a result of increased activity by the U.S. technicians. These supplies will be provided by the GOK, except that USAID will cover some of these costs during the first year of the project allowing GOK to phase this new cost into its budget and to assure an adequate inventory at the initiation of the project.

Cost estimates for the GOK are based upon actual costs in terms of the various levels of personnel and salaries and wages. The personnel requirements were calculated on the basis of present and future staff recommended to achieve project objectives. Transportation costs (vehicle operation) were calculated at three Kenya Shillings per kilometer, which is the standard used by the GOK, with an estimated use of 120,000 km/year or 12,000 km per vehicle. Per diem is based upon the present rate of 200 Kenya Shillings. The value of laboratory space for project utilization is based upon a cost of 40 Kenya Shillings per year per square meter of floor space.

Agricultural land was given a rental value of 800 Kenya Shillings per hectare. The cost of administrative support was developed by taking 20 percent of the total department budget for this item. (Administrative support will be a major requirement at KARI and will definitely absorb that percentage of administrative support.) Other items were based upon best estimates of amounts required and actual costs.

AID-funded project inputs will flow into the total program and total outputs will result from FAO-related activities. The effective use of AID inputs by FAO will be reviewed in the periodic project evaluations.

65

VII. PROJECT FEASIBILITY

The project's economic feasibility is treated in Appendix I; its technical feasibility in Appendix II; and its administrative feasibility in Appendix III. Brief summaries of each category follow.

Economic Feasibility

As with research projects generally, it is difficult to quantify the benefits rigorously. Available information suggests, Appendix XIX (Ref. 6), that the pay-off or return to investment in agricultural research is tremendous, although such pay-off cannot typically be realized in the short-term. Achievement of program objectives, however, will clearly result in significantly enhanced agricultural production and other economic benefits. Further, the proposed AID funding is in furtherance of a clearly cost-effective activity.

Technical Feasibility

The technology to be studied and recommended will focus on pragmatically useful methodology. Equipment and commodities, for example, would be that within the small-holders' means and practical for his/her adoption. Cultural and social practices, as well as the agriculture-specific sciences, would figure in all "crop package" equations and recommendations.

Administrative Feasibility

The project - and program - will, to succeed, call for cooperation and support of several GOK entities as well as the FAO/AID teams. It is believed that the necessary commitment and dedication exist on the GOK side, and that sufficient GOK personnel are to be assigned to the project, and that project/program objectives will not be unduly impeded due to administrative arrangements.

VIII. CONDITIONS PRECEDENT, COVENANTS AND NEGOTIATION STATUS

1. In addition to standard grant CPs, USAID intends to require:

   (a) evidence that FAO is committed to the program and that FAO funding and personnel will be available on a basis and at times compatible with the successful and timely implementation of the AID funded project;

   (b) submission of a plan indicating that all necessary GOK counterpart personnel for the AID project will be available on a timely basis; and

   (c) a statement from the GOK as to its planning to retain qualified Kenyan scientists for this project, once trained and in position.

2. A further CP to the availability of AID funds for training purposes will be submission to and acceptance by USAID of a life-of-project training plan, to be prepared by the GOK/MOA in collaboration with the USDA.

3. One special covenant will call for the GOK to accept the evaluation arrangements outlined above in this PP. Another will require the GOK to provide rural sociologist services as determined necessary by both the FAO and AID sponsored teams.

This PP has been reviewed and accepted by both the GOK and FAO. The GOK has requested the assistance from USAID (appendix XV). FAO/Nairobi is seeking approval of its proposed undertakings from its headquarters, Rome.

IX. ENVIRONMENTAL CONSIDERATIONS

These are treated in Appendix IV. The conclusion is that neither project nor program will adversely impact on the environment in any forseeable way. Rather, accomplishment of project/program objectives will enhance the environment by decreasing soil erosion and reducing amounts of pesticides/insecticides/herbicides now being used.

X. SOCIAL SOUNDNESS/ROLE OF WOMEN

See Appendix V for detailed treatment. The conclusion is that both project and program are considered socially sound and will have a beneficial impact upon women in the target areas.

ECONOMIC FEASIBILITY

(1) Overview

The economic feasibility of this project depends on the extent to which the research components of the USAID and FAO projects interact with and support each other. The USAID plant-breeder's activities complement those of the plant pathologist, agronomist, soil physicist, agricultural economist, and agrometeorologist, and vice versa. The proposed pre-extension activities of GOK's rural sociologist and the FAO's agricultural economist and agricultural systems specialist will complement those of the AID-funded "basic" scientists and provide a basis for implementing the research findings.

Although the focus of this project is on food crops problems in the semi-arid areas, the scope of the project is broad and includes research that will help solve problems in the high rainfall areas as well, e.g., plant disease, soil erosion, etc. Thus the project assures a continuum of research efforts to increase the food production of the country as a whole.

As with any research activity, this project does not lend itself easily to 'ex ante' quantification of the objectives and outputs. The research is designed to develop base data, analytical models and strategies for implementation, and to make recommendations concerning improved plant varieties, cropping systems and resources combinations which, when adopted, will maximize agricultural output of smallholders in semi-arid areas. The technical outputs from the basic research in the form of recommendations are expected to be forthcoming early in the life of the project so that, when they are adopted, increased crop production can be realized. Increased production will generate several secondary and tertiary productive activities leading to increased economic welfare of the target areas and the country as a whole.

(2) Methodology

The economic analysis that is most appropriate for this project is a cost-effectiveness analysis. This analysis is useful in demonstrating that a reasonable qualtifiable cost is associated with the expected outputs/objectives. The outputs/objectives of this project consist ultimately of increased food production of the marginal rainfall areas. An important intermediate output/objective, however, consists of training MOA technicians who will contribute to the final output.

(3) Cost Effectiveness

The American Technical Assistance Corporation Manpower Survey (Ref. 3) has analyzed the demand for and supply of trained manpower in Kenya, and concluded that there is

a manpower shortage of trained personnel in agriculture, particularly those with diplomas and/or degrees. The current supply of graduates and diploma and certificate holders is inadequate to meet the apparent demand. Under these conditions, competition among employers is keen, and the MOA (whose salary scale is low relative to the private sector) finds it particularly difficult to attract the needed number of graduates into its programs.

One major constraint as pointed out by the ATAC study is training capacity. It is apparent that the current capacity of agricultural training facilities in Kenya is inadequate to meet the objectives of this project. One alternative for providing the number of trained technicians to meet the requirements of the project and for assuring that its objectives are met is to train Kenyans as proposed in the project. Another is to improve the institutional capacity of Kenya for such training. Both aspects are being addressed under the Agricultural Systems Support Project, implementation of which is now starting.

Academic training of the counterpart technicians as proposed will not guarantee their services with the MOA, but it is hoped that careful selection, practical orientation (one year service before academic training begins), occupational association and incentives for advancement (i.e. the assurance of taking over the research activities upon termination of the project and monetary renumeration) will minimize job turnover. The possible change in KARI's status to one of autonomy from the GOK might result in an improved KARI compensation scheme, which of course would help greatly.

It has been estimated 'ex post' that the maize breeding program alone in Kenya, supported by USAID over the last ten years, realized an increase in maize production valued at over $45 million (Appendix IX). Through this project it is possible that yields will continue to increase through the introduction of new varieties; but equally important will be the significance of the research project in controlling diseases, improving crop varieties, preserving the soil through improved cropping systems, and the expansion of crops in areas where production previously was uncertain.

This research program in collaboration with FAO will develop a technological package that will consider alternative cropping systems; improved crop varieties; information and recommendations on soil fertilization; soil preparation and method and time of planting. It will examine and make recommendations concerning the marketing and distribution systems, related (complementary and supplementary) farm and non-farm opportunities, cooperatives and credit systems and, in collaboration with appropriate government institutions, develop strategies for implementing recommendations that will improve the overall welfare of the target area.

9/72

Conventional development projects typically have a 15 to 20 percent annual internal rate of return. This is considered good, but returns to investment in agricultural research are generally much higher. Indeed, there has been a proliferation of studies which indicate that returns to investment in agricultural research are often two to three times higher than returns to other types of agricultural investment. For example, the annual internal rate of return to investment in agricultural research in India (for all commodities from 1953-71) is estimated at 40 percent; for hybrid corn in the U.S. from 1940-55, from 35 to 40 percent; and for rice in Japan from 1930-61, the annual return is estimated at 75 percent. Indeed, based on the available evidence concerning the payoff to investment in all types of development projects in developing countries, few such projects are able to match the returns realized in agricultural research projects.*

Based on this evidence, the economic benefits from this USAID-FAO/UNDP research program, while they cannot be quantified, are expected to be considerable. They are likely to be manifest by: greater economic returns to producers from improved cropping systems;

reduction in out-migration of productive males, and increased employment; outputs in the form of trained MOA technicians, whose work will contribute ultimately to increased crop production; and improved infrastructure (transportation, services, etc.) resulting from increased production. Given the characteristics of the target group and the agricultural policy of the GOK (which strongly endorses development of the semi-arid areas), the research project will insure effective development of the target area, and that this development will have a spread effect which will induce positive changes in the economic welfare of the country as a whole.

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* Results of these and other studies are summarized in Thomas M. Arndt, Dana G. Dalrymple, and Vernon W. Ruttan, Resource Allocation and Productivity in National and International Agricultural Research (Minneapolis: University of Minnesota Press, 1977), pp. 5-6.

TECHNICAL FEASIBILITY

The USAID/Kenya and USDA project design team has based its judgments as to the technical feasibility of the project on an evaluation of past and present programs. The present state of agriculture in Kenya, GOK's initiatives and capability of institutions and individuals have also been considered. An effort was made to consider all aspects of the project and to conduct research in conjunction with FAO's Drylands Farming Research Project, thus providing a technological package for the small-holder in the marginal rainfall areas of the country.

The choice of the technologies recommended for this project is based upon two and one half weeks of intensive review of the on-going (1975-78) USAID project entitled "East African Food Crops Research Project," (Documents resulting from this review are available with the Kenya Desk, AID/W). The American technicians and, in many cases, Kenyan technicians or assistants working on the project or involved with related projects, were interviewed. Laboratory and field experiments were observed, with special attention given to the level of technology presently being used by the researchers. In addition, the team observed small farms in the marginal rainfall areas and larger farms in the high rainfall areas to gain an understanding of the problems of farmers and their current level of technology. The manager of a seed supply company, staff members of the MOA and many others with knowledge of agriculture in Kenya, were also interviewed. Based upon this intensive review, it was the judgment of the team, endorsed by USAID/Kenya, and based on the considerations outlined below, that the research program recommended in this project is technically feasible for Kenya and that it is also feasible for farmers to adopt the type of technology likely to be recommended as a result of this research.

Discussions with personnel of the GOK's Extension Service revealed a capable delivery system for conveying technological innovations and information to farmers. However, an improved level of training for new extension workers is recognized as a major objective. This will be achieved by increased enrollment at Egerton College under the ASSP activity now getting under way. The cooperative effort at the district level between extension personnel and research workers seemed to be adequate but will be strengthened through this project.

The level of technical sophistication used in the various research activities will vary considerably. Much of the work is of an applied nature and involves a limited amount of advanced technology. However, some components of the project, such as agrometeorology and soil physics, will involve the use of complex instruments to measure soil and water relations. A computer will be used to store and analyze data

generated by these scientists and will assist the effective development of the plant breeding program. Kenyan counterpart technicians should be able to carry on the research at the completion of the project.

The development of new crop varieties is one of the technological developments that Kenya will be able to utilize and maintain with the least amount of difficulty. Adoption will require very little capital input. Little educational effort will be necessary (unless a new variety would require adoption of new cultural practices, which is unlikely). There is ample evidence from past experience that Kenya farmers will make the necessary adjustments. The rapid increase in the use of hybrid maize is a good example of what can be achieved. The country's ability to continue to produce seed of new varieties is not in question, due to the highly successful Kenya Seed Company and the Kenya Seed Inspection Service.

Farmers in Kenya have shown their willingness to accept new varieties and crops (e.g., the hybrid maize). The producers in the target area are often referred to as subsistence farmers but actually they are part of the market economy since they will sell part of their crops and then buy back what is required for food; in this regard, the constraint of inadequate storage facilities is being addressed under ASSP. Kenyan small-holders have demonstrated a keen sense of economic value and, if the worth of new technology is demonstrated to them, its acceptance can virtually be assured. The FAO agricultural economist and systems specialist, together with the rural sociologist to be furnished by the GOK, will continually be working with this aspect of the activity. Recommendations will be developed with full awareness of relevant economic and social constraints. Some parts of the technological package such as new varieties of commonly grown crops (i.e. maize or pigeon peas) will be virtually "cost free". Likewise, marginal small farmers in the high risk area will be able to utilize recommendations on controlling disease by crop rotation or controlling insects by following practices that favor naturally occurring biological control mechanisms. The Agricultural Economist to be provided under the FAO component of the program will determine the economic soundness of significant changes such as different tillage and terracing practices that increase penetration and retention of soil moisture. (The value of increased production would, of course, have to be weighted in individual cases against economic and social costs).

Emphasis of this research project is to develop production technology for the marginal rainfall areas. However, farmers in the high rainfall areas may be able to use some of the improved practices, such as the soil and water relationship to determine time of planting. New

75/174

varieties that are disease and insect resistant may be of value as well as recommendations for crop rotation in areas where maize is grown in monoculture. Also, recommendations developed for improving land preparation and soil conservation could be applicable to the high potential areas. It is also reasonable to expect that farmers in the higher rainfall areas will be willing to invest in cost-incurring management practices (e.g., fertilizers, pesticides, mechanization), providing the cost/benefit ratio warrants the investment. Thus, if experiments in the marginal rainfall area result in the development of technological complex management practices that are too costly to be utilized in the higher risk areas of the MRA, it is quite possible that they can be used in the low risk, high rainfall areas.

The members of the USAID/FAO research team will maintain close liaison with the MOA extension service to insure the latter's understanding of the research effort and problems. This will also enable extension personnel to detect approaches that may not be feasible as well as to suggest alternatives. Close cooperation between members of the extension service and the FAO research team will ensure rapid diffusion of successful management practices.

As indicated above, trained manpower in Kenya is definitely a limiting factor, especially in the field of agricultural development. USAID has been assured by the Director of Research (MOA) that, because of the high priority placed on agricultural development by the MOA, suitably qualified technical people will be assigned to the project. As described in Part II of this PP, personnel training and development will be of highest priority to the project. It is believed that the MOA will continue to view this approach to the development of the marginal rainfall areas as a permanent effort. It will, therefore, be possible to have a trained technical staff in place at the termination of the project.

Adequate laboratory and office space are available to KARI, Muguga. Administrative and support staff are adequate to support the technical aspects of the project.

17

ADMINISTRATIVE FEASIBILITY

The proposed project will involve the cooperation and support of several governmental organizations. A description of the capability of these organizations to carry on the responsibilities anticipated, linkage relationships (mechanisms for coordination), ability of organizations to administer contracts, and administrative arrangements to reach and involve the target population follows:

(1) Kenya Agricultural Research Institute (KARI) at Muguga

KARI (formerly EAAFRO, a department of the East African Community) is a well-established research institution that has served East Africa for many years. It was moved from Amani, Tanzania, to Kenya in 1948. With the breakup of the Community in 1977, the facility and research located in Kenya have become an institute of the GOK and the institute now has a more Kenya-specific orientation. (Emphasis previously was on research of more regional interest and application.)

It is possible that in due course KARI will move to autonomous status. If so, this would likely result in an increased compensation scale, thus making KARI more competitive with private industry in the personnel category.

KARI is currently divided into three divisions, of which the Agricultural Research Division is the principal one relevant to purposes of the proposed project. Although understaffed (like most Kenyan institutions) and currently reorientating its effort toward applied research, it has good facilities and capable research staff that are well organized and administered; improvements proposed under this project, however, are necessary for KARI to realize its full potential. KARI has established good working relationships with the USAID/PASA team. If a proposed reorganization plan now being considered by the GOK is implemented, the Institute would serve as the national agricultural research center.

It is not believed--given KARI's situation as outlined above--that KARI needs significant "institution-building" assistance as such. However, administrative and management advice (as well as scientific inputs) would be welcome additional skills to the personnel, especially as KARI moves to the status of Kenya's national agricultural research facility.

All USAID technicians, with the exception of the Maize Breeder, will be located at Muguga, within the divisions associated with the technicians' disciplines. One Maize Breeder will be located at the Kitale Research Station. They

will be administratively and technically responsible to their respective division heads and the Director of KARI. The Director of KARI will be responsible for establishing the administrative linkages with other cooperating organizations. The Director, as well as the USAID team leader, will be responsible to see that the linkages established are adequately utilized in the planning and implementation of the research activity as well as the dissemination of results to the target area.

KARI, as the former EAAFRO, has had experience in administering USAID contracts. The administration is recognized both by the GOK and USAID/Kenya as having the ability to administer contracts effectively.

Administrative arrangements are being made to reach and involve the target populations. The research planned is within Machakos and Kitui Districts where the District Agricultural Officers meet and have discussions with Research Officers on the activities of the Stations and those of the Districts. The FAO agricultural systems scientist will help place the research into an economic package by working with extension officers and the target group. The FAO's agricultural economist and agricultural systems specialist, together with a rural sociologist to be furnished by the GOK, will work within the target group to involve and understand the people so that in collaboration with the extension and research station staff, a sound package can evolve from the research program. Facilities for utilizing mass media techniques are available at KARI and the National Agricultural Laboratories (described below) and will be linked and utilized in reaching the target group.

(2) National Agricultural Laboratories (NAL) at Nairobi

The NAL, known as Scott Agricultural Laboratories until 1963, is a well established institution that has served Kenyan agriculture since 1903. It has responsibilities and capabilities in the technical service, research, and information dissemination areas that are vital to the success of the proposed new project. The research of the soil survey division, which has cooperated with the Consortium for International Development's team in the just-completed arid/semi-arid land study, is the base from which the soil aspect of the integrated research project will begin. A strong soil chemistry division, with good laboratory facilities for chemical analyses and an experienced field researcher, will provide backstop support and will collaborate in developing project activities in the medium rainfall areas.

The plant pathology department at KARI, with recognized expertise in nemotology and bacteriology, together with complementary expertise in virology provided by a cooperative arrangement between MOA and the British Overseas Development Ministry (ODM), will provide facilities as well as staff to develop and implement research in the plant

29

pathology area. A well-organized information dissemination department at the NAL, with broad capabilities in the use of mass media, will serve as an excellent resource in the spread of information to the target groups.

While the USAID PASA technicians (excluding the Maize Breeder at Kitale) will be physically located at KARI (Muguga), a close linkage will be maintained with NAL in those areas where researchers have common interests and related research. Full consultation and cooperation will be involved in both the planning and implementation of research. Staff in soil survey, entomology, plant pathology and soil chemistry will be specifically and intimately involved. The NAL is administered through the Ministry of Agriculture (MOA), as is KARI. Therefore, research in both organizations is coordinated by the Director of Research in the MOA who will establish the administrative linkages through the Director of KARI and the PASA team leader.

The NAL is primarily a service institution and has strong linkages with the extension service and the target population. The Rural Development Support Communications Center of NAL has the capability to reach the target group via mass media.

(3) University of Nairobi at Kabete

The University of Nairobi, Kabete Campus, is a new institution, having been organized in 1970 as a part of the University of Nairobi system. Previously, most Kenyans studying agriculture at the university level went to Makerere University in Uganda. The Faculty of Agriculture at the University of Nairobi, Kabete, is organized into six departments: Crop Production, Soil Science, Agricultural Economics, Animal Production, Food Science and Technology, and Agricultural Engineering. Both B.Sc. and M.Sc. level training are available, with provisions for the Ph.D. degree via the thesis research route. Possible expansion and curriculum revision at the Faculty are topics for study under ASSP.

As of 1977, 80 new students per year are being admitted into the B.Sc. Program in Agriculture. In addition, students are admitted into special B.Sc. programs as follows: 20 students/year in Food Science and Technology; 30/year in Agricultural Engineering; and 10/year in Forestry. A postgraduate diploma is offered for one year of post B.Sc. work in two areas: irrigation and soil and water conservation. This program admits 15 students per year, and the one-year program consists of nine months of academic training and three months of field training. Currently 104 M.Sc. students are enrolled in the two-year M.Sc. program in six areas: Animal Production, Agricultural Economics, Agronomy, Plant Breeding, Soil Science, and Plant Pathology. One year of the program is devoted to course work and one year to field research. The staff in the

Faculty of Agriculture is approximately 40 percent Kenyan, 10 percent from other African countries and 50 percent expatriate. The staff is assigned to the M.Sc. program in addition to their regular staff assignment. There also is a shortage of physical facilities and the library needs additional reference materials if adequate training is to be given at the advanced degree level. The M.Sc. programs are tied to ongoing field research activities.

There is a major research program in Integrated Grain Legume Improvement. This involves beans, pigeon peas and cowpeas. There are over six man-years of plant breeder, agronomist, physiologist, pathologist, entomologist and soil scientist input into this project which is targeted to the needs of the marginal rainfall area. The Director of KARI, as well as the USAID Team Leader, will be responsible for establishing and effectively utilizing a linkage with these researchers. The technicians will contribute to the training of scientists in their specialty by giving occasional lectures and/or by co-advising M.Sc. students in their field research. These students will do this research at Muguga or in the Dryland Area and thereby contribute to the project.

(4) Other Organizations within Kenya

Collaboration with the MOA extension service, with staff of IADP and with the MOA's Land and Farm Management Division will be necessary to effectively reach the target group. The District Agricultural Officer (DAO) and his field staff and IADP field staff will be in daily contact with the target group. They have the responsibility and capability to utilize both personal contact and the mass media in reaching the audience. Linkages will be established by the Director of KARI to insure that information flows effectively and that there is full cooperation and collaboration with extension, IADP staff, and the project research team.

The Kenyan Seed Company is the major producer of seed of improved varieties in Kenya. It has the capability to produce seed of any crop needed. Linkages will be maintained to insure that it produces the best materials available and that seed is available to people in the target area.

The Kenya Inspection Service for Seeds (KIS) has the responsibility for the maintenance of seed purity and quality. A linkage will be maintained to insure an awareness of problems encountered by them as well as project staff.

81/82

(5) Other Donor Agencies

FAO is presently involved in the marginal rainfall areas developing/testing new varieties of sorghum and millets; designing/testing small-scale farming tools and equipment; and developing sheep and goat production/marketing systems for the smallholder. The new FAO Dryland Farming Research Project will focus on pre-extension testing and adoption of farming systems technologies (cropping and livestock) that are appropriate for the MRA and, in coordination with the Kenya Extension Service and the Integrated Agriculture Development Program staff, will insure that these technologies are rapidly disseminated to smallholders for adoption. FAO also plans to add eight additional staff members at Katumani during 1978/79* as a critical and integral part of the program to which the proposed AID project will contribute.

The MOA is considering the development of a total program for the Dryland Area and has asked support from various donors in this effort. Linkages with donor organizations will be established and maintained to maximize returns and insure complementarity of all programs. The Director of Research in the MOA has this administrative responsibility.

The British Overseas Development Ministry (ODM) is involved in virology research at Muguga. As this group is located at KARI (Muguga), a close linkage will be maintained with the USAID plant pathologist.

ICRISAT, IITA, and CIMMYT have representatives located in East Africa. The Director of KARI and the USAID PASA Team Leader will be administratively responsible for establishing and maintaining effective utilization of the resources of the International Centers.

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*Soil Physicist (Soil Management Conservation); Agronomist (Cropping Systems); Agronomist (Physiologist); Plant Breeder (Legume and Oilseed); Plant Breeder (Tubers and Root Crops); Animal Nutritionist/Husbandry; Farm Management Economist; Plant Protection Specialist; Rural Sociologist (subcontracted through the University of Nairobi and provided by the GOK).

83/84

INITIAL ENVIRONMENTAL EXAMINATION

Project Location	Muguga, Kenya
Project Title	Research and Development of Agricultural Systems for Semi-Arid Areas
Funding	$6,003,283
Life of Project	Five Years
IEE Prepared by	USAID/Kenya Project Committee
Date	April 1979
Environmental Action Recommended	Negative Determination
Concurrence	Glenwood P. Roane Mission Director
Date	April 1979
Administrator's Decision	(Concurrence/Nonconcurrence)
Date	_____

Signature _____

45

SUPPORTING STATEMENT

The program of which this project is a major part combines agricultural research with delivery of results of that research to smallholders. Both program and project will deal with improved methods of utilizing soil and water for agriculture production to enhance producers' returns. These improved methods of soil and water utilization will be beneficial in terms both of increased agricultural production and also reduction in soil erosion. More specifically, the present excessive soil loss during torrential rainfall leads to the silting up of dams and reservoirs and disruption of transportation by soil deposits on the roads. Erosion damages or destroys water supplies, roads and bridges. Both program and project are intended, inter alia, to decrease the soil loss and reduce the potential force and amount of water runoff through terracing and better cropping systems.

Both the program and project will study the diseases and insects adversely affecting crop production. Efforts will be made to breed pest-resistant crops. In addition, biological control measures will be studied to control harmful insects. Such measures will reduce the need for the use of pesticides and insecticides that may be harmful to the environment.

It is noted that a certain small amount (less than $4,000) of pesticides will be purchased for use under the A.I.D.-funded project. All such pesticides (which cannot be specifically identified until arrival of the team) will be used exclusively for research purposes and confined to small areas under controlled research station conditions. The objectives of this experimentation will be to reduce to an economically efficient minimum the amount of pesticides/insecticides now in use. PASA and GOK personnel will be made fully aware during project implementation of A.I.D.'s environmental standards concerning pesticides and project documentation will contain appropriate undertakings in this regard. The use of pesticides/insecticides and disposition of treated crops will be in accordance with Reg. 16, Section 216.3(b)(2)(iii).

There is only a minor construction element associated with this project. This consists of erecting one prefabricated four-bedroom guest house at the Kampi ya Mawe Research Station that would be used by project scientists during overnight trips to the facility.

Any irrigation or other land and water use activities will be undertaken in a controlled research environment. As a result, the environmental impact on land use, public health, water, and use of other natural resources will be negligible. The technical assistance team will be aware of A.I.D.'s environmental concerns (physical and sociocultural) and will be examining various technological packages in the light of

these concerns so as to develop packages optional both from a technological and an environmental standpoint.

Recommendation

The project will fund, primarily, technical assistance, and participant training. It will have no physical impact on land and water resources save in some instances of a controlled research nature. Requirements contained in Reg. 16 with regard to the use of pesticides in a research activity will be followed. Environmental considerations will be paramount in the research undertaken by A.I.D. technical assistance personnel.

It is concluded that the proposed project is not one which will have a significant effect on the human environment and, therefore, a negative determination is recommended.

SOCIAL SOUNDNESS ANALYSIS AND THE ROLE OF WOMEN

The social benefits anticipated from this project will be forthcoming during and beyond the life of the project, and although these benefits cannot be quantified 'ex ante', they will be distributed among the primary target group, which includes the small limited resource farmers and rural residents, as well as secondary target groups throughout the country. Specifically, the benefits should include, at least to some extent:

(1) improved nutritional status and health
(2) decreased male out-migration
(3) improved group cohesiveness, and
(4) expanded opportunity for community development

The project is socially sound and compatible with the primary target group as well as all other groups in Kenya. The initial research target area includes the Machakos and Kitui districts of Eastern Kenya in which the overwhelming majority (95%) of the rural population is of the Akamba tribe, characterized by those qualities that promote economic development. These include: flexibility of society, willingness to accept change, acquisitive values and cooperative spirit, and a strong achievement motivation. GOK agricultural policy strongly endorses development of agriculture in the marginal rainfall areas and of the rural poor located in these two districts within the marginal rainfall areas.

The social impact and the distribution of the benefits resulting from this research project are expected to be positive, with little or no undue burden placed on the different groups within the internal target population and beyond. Values, beliefs, social structure and organization of the primary target groups, because of the characteristics of the people, will be minimally disrupted. What the research project will do is to remove many of the constraints which, because of lack of resources and knowledge, the people themselves cannot remove. The research team, in collaboration with the appropriate organizations, will develop a technological package with the existing resources of the target group and with minimum cost incurring resources and within the existing social, economic and political structure of the target group.

A recent study of the target area revealed that the adult male (working) population is less than the adult female population (average 78 males to 100 females) (ref. 1). Furthermore, the study area is characterized by a highly youthful population - approximately 50 percent are under 15 years of age. These two statistics have rather strong economic implications for the area's productive capacity and the role of

women. With the productive population (age 15-60 years) constituting only 44 percent (of which productive male workers constitute only about 33 percent due to out-migration in search of job opportunities), a great burden is placed upon women and a small proportion of the working male population and older males to produce the agricultural outputs needed for subsistence by the entire group. This project, therefore, will insure a greater agricultural productive capacity of the target area with special attention to the role of women in the agricultural production, and will help to alleviate the seasonal agricultural labor shortage by making agricultural employment attractive enough to reduce significantly the increasing out-migration.

Three activities which will facilitate that relative research findings reach women farmers who constitute the majority of the agricultural producers are: (1) The Agriculture Information Center at the National Agricultural Laboratory is developing improved extension methodologies for transmitting improved agricultural practices to women farmers based on research findings developed by the agricultural research centers. (2) It should be emphasized that the focus of this project is on the development of agricultural packages appropriate for the semi-arid farming areas. The primary components of these packages will be on food crops as opposed to cash crops. Therefore this project meets the needs of small farmers in general, and women farmers in particular since women farmers primarily cultivate food crops as opposed to cash crops which are primarily under the responsibility of male producers. (3) The nomination of women participants will be encouraged for all available training activities funded under this project.

To assure that research findings are relevant and reach small farmers, all training, both U.S. and in-country, will include courses dealing with the socio-cultural factors involved in the adoption and diffusion of new crops.

LOGISTIC SUPPORT FOR PROJECT

Major in-country project support will be through the established channels of the KARI administrative unit at Muguga. Where there is joint involvement with such agencies as NAL, University of Nairobi, FAO, etc., the arrangements for logistic support will be through the Director of KARI after his discussions with those responsible at the respective institutions. All of these organizations have expressed their interest in this project and their willingness to cooperate.

The divisions within KARI are required to project financial needs which are utilized in formulating a budget that is assigned to the particular division. Standard procedures are followed for the purchase of supplies and equipment, and for normal operating expenses. These procedures appear reasonable and administratively sound. Arrangements are available for the immediate cash purchase of small items needed on short notice. A contingency fund is maintained within the Director's office for emergency and unanticipated expenditures. The KARI maintains a workshop for the fabrication of equipment needed for projects. This unit is apparently quite responsive. There is a pool for vehicles and equipment as well as a maintenance facility. While the number of vehicles available is often inadequate to meet all requests, this project would, of course, fund the purchase of additional vehicles. Field assistants and laborers are assigned to each division. These can be utilized at Muguga or transported to the research areas where field trials are conducted. Labor can also be requested from the outlying stations where work is located and the station is paid for such labor from KARI/ARD project funds. Large field equipment is provided by the research station but equipment meeting special project needs is transported from Muguga.

The system through which host country support flows appears adequate from the standpoint of accountability and resource management. PASA technicians will be expected to become familiar with the system, work within it, and suggest how to improve it (rather than ignore or attempt to circumvent it). The GOK has assured financial support for maintenance and operation of the project. There are difficulties in obtaining major items such as large pieces of equipment, instruments, vehicles, etc., some of which are included in the USAID contribution. There also are problems of availability of necessary supplies within the country and the speed with which they can be obtained. None of these difficulties/ problems is believed insurmountable.

The USDA will be responsible for all project activities relating to U.S. support. This will include the purchase in the U.S. of project commodities, following AID regulations and procedures. USDA will also arrange for all U.S. training activities for Kenyan participants under this project. In addition, USDA will have the ultimate responsibility of assuring that the required technicians are available when needed, and will be responsible for maintaining close liaison with the field work in Kenya. USDA will be authorized an executive visit each year to review project accomplishments and problems.

The team leader appointed by USDA will be its responsible representative in Kenya who will control and be accountable for the USAID contribution to the project. This person will work directly with the Director of KARI and in collaboration with him make decisions relating to all technical matters concerned with the project activities. This will include preparation and review of annual work and research plans and the coordination of the various research activities to insure that the final result is useful to the target group. In conjunction with the Director of KARI, he will select participants for training in the United States and will recommend any international project-related travel to USAID for its approval.

The team will coordinate on contractual matters with a Project Manager from the USAID/Kenya Food and Agriculture Office who will have the responsibility of monitoring the project to the normal extent on behalf of USAID.

APPENDIX VII and
APPENDIX VIII

FINANCIAL APPENDIX

VII (1) SUMMARY OF PROJECT COSTS

VIII (2) AID CONTRIBUTION

- (a) Personnel Costs
- (b) Participant Training
- (c) Travel and Per Diem
- (d) Equipment
- (e) Expendable Supplies
- (f) Project Evaluation

VIII (3) GOVERNMENT OF KENYA CONTRIBUTION

VIII (1) SUMMARY OF PROJECT COSTS

Project Input	FY 1979		FY 1980		FY 1981		FY 1982		FY 1983		FY 1984		Total		Total Project Costs
	AID	GOK	AID	GOK	AID	GOK	AID	GOK	AID	GOK	AID	GOK	AID	GOK	
Personnel Costs	$330,550	$ 78,204	$ 766,700	$320,250	$ 766,700	$350,603	$ 766,700	$382,819	$ 766,700	$415,034	$574,750	$329,395	$3,972,100	$1,876,305	$5,848,405
Participant Training	15,400	4,295	237,600	17,450	303,600	18,523	299,200	19,598	299,200	20,671	24,200	16,107	1,179,200	96,644	1,275,844
Travel & Per Diem	7,000	5,572	16,000	23,275	16,000	24,349	16,000	25,845	16,000	28,386	7,000	22,342	78,000	129,769	207,769
Equipment	448,774	1,846	5,000	7,416	44,904	7,551	5,000	7,684	5,000	7,819	5,000	5,939	513,678	38,255	551,933
Expendable Supplies	38,624	3,222	4,818	13,020	4,818	13,557	4,818	14,094	4,818	14,632	2,409	11,275	60,305	69,800	130,105
Project Evaluation	—	—	—	—	125,000	—	—	—	—	—	75,000	—	200,000	—	200,000
Rental of Land & Buildings	—	4,779	—	19,114	—	19,114	—	19,114	—	19,114	—	14,335	—	95,570	95,570
Administrative Support	—	42,282	—	166,712	—	165,906	—	185,570	—	188,255	—	144,967	—	893,692	893,692
	$840,348	$140,200	$1,030,118	$567,237	$1,261,022	$599,603	$1,091,718	$654,724	$1,091,718	$693,911	$688,359	$544,360	$6,003,283	$3,200,035	$9,203,318
													65%	35%	100%

1) FY 1979 includes ¼ year cost of five-year project.

2) FY 1984 includes ¼ year cost of five-year project.

VIII (2) AID CONTRIBUTION

Personnel Costs	$3,972,000
Participant Training	1,179,000
Travel and Per Diem	78,000
Equipment	511,000
Expendable Supplies	60,000
Project Evaluation	200,000
	$6,000,000

APPENDIX VIII 2(a) PERSONNEL COSTS

Position	Position Classification	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	Total
Senior Maize Breeder	FC-11	$ 41,500	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 70,500	$ 488,000
Maize Breeder	FC-10	40,250	89,000	89,000	89,000	89,000	66,750	463,000
Agriculture Economist	FC-11	41,500	94,000	94,000	94,000	94,000	70,500	488,000
Plant Pathologist	FC-10	40,250	89,000	89,000	89,000	89,000	66,750	463,000
Agrometeorologist	FC-11	41,500	94,000	94,000	94,000	94,000	70,500	488,000
Agronomist	FC-10	40,250	89,000	89,000	89,000	89,000	66,750	463,000
Soil Physicist	FC-10	40,250	89,000	89,000	89,000	89,000	66,750	463,000
Administrative Assistant	(Local Hire)	3,000	12,000	12,000	12,000	12,000	9,000	60,000
Short-term Consultants		12,000	47,000	47,000	47,000	47,000	35,000	235,000
		$300,500	$697,000	$697,000	$697,000	$697,000	$522,500	$3,611,000
Inflation and Contingency 10%		30,050	69,700	69,700	69,700	69,700	52,250	361,100
		$330,550	$766,700	$766,700	$766,700	$766,700	$574,750	$3,972,100

96

BASIS FOR COST ESTIMATE OF PERSONNEL COSTS

The personnel costs are based on actual and projected USAID/Kenya costs using average of a family of four.

		First Year	Subsequent Years
1.	Salary plus Overhead	$ 55,000	$55,000
2.	Travel to Post/Return	8,000	--
3.	Air Freight/Return	5,000	--
4.	Temporary Lodging	4,000	--
5.	Quarters Allowance	16,000	20,000
6.	Education Allowance	8,500	8,500
7.	Home Leave/Return (averaged)	--	4,000
8.	Guard Service	1,500	1,500
9.	Furniture	10,500	--
10.	Storage	2,000	2,000
11.	Miscellaneous	3,000	3,000
	Total	$112,000	$94,000

APPENDIX VIII 2(b) PARTICIPANT TRAINING

Level of Training / Degree Programs	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	Total
Ph.D. Level U.S. (4)			$ 60,000	$ 60,000	$ 60,000		$ 180,000
M.Sc. Level U.S. (14)		$105,000	105,000	105,000	105,000		420,000
M.Sc. Level Kenya (5)		12,000	12,000	8,000	8,000		40,000
B.Sc. Level U.S. (Diploma Holders) (8)		60,000	60,000	60,000	60,000		240,000
Non-Degree Programs							
Structured Course (abroad) Total of 30 man-months	$ 4,000	$ 16,000	$ 16,000	$ 16,000	$ 16,000	$12,000	$ 80,000
Professional Development (abroad) Total of 30 man-months	5,000	18,000	18,000	18,000	18,000	5,000	82,000
Local Seminars (includes conference costs without travel and per diem)	5,000	5,000	5,000	5,000	5,000	5,000	30,000
	$14,000	$216,000	$276,000	$272,000	$272,000	$22,000	$1,072,000
Inflation and Contingency 10%	1,400	21,600	27,600	27,200	27,200	2,200	107,200
	$15,400	$237,600	$303,600	$299,200	$299,200	$24,200	$1,179,200

Standard rate for training in the U.S. is $15,000 per year
Ph.D. level - 3 years training
Master level - 2 years training

APPENDIX VIII 2(c) TRAVEL AND PER DIEM [1/]

Technicians	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	Total
In-Country	$4,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$4,000	$44,000
Outside Country [2/]	3,000	7,000	7,000	7,000	7,000	3,000	34,000
	$7,000	$16,000	$16,000	$16,000	$16,000	$7,000	$78,000

1/ U.S. contributions for round-trip travel costs of technicians and TDY personnel, and one-way travel costs for Kenyan trainees have been included in participant training and TDY budget.

2/ To attend project-related international conference or workshops, subject to approval of USAID/Kenya.

APPENDIX VIII 2(d) EQUIPMENT

	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	Total
Purchases in U.S.	$297,414		$14,775				$312,189
Purchases in Kenya	151,360		25,129				176,489
Shipment of Scientific Equipment to U.S. for Repairs & Replacement Parts		$5,000	$5,000	$5,000	$5,000	$5,000	$ 25,000
	$448,774	$5,000	$44,904	$5,000	$5,000	$5,000	$513,678

EQUIPMENT EXPENDITURES FOR USAID PURCHASE IN U.S.

Item	U.S. Dollars 1979	1981
Refrigerators (4)	$ 1,500	$ 500
Freezers (2)	500	500
Ice Cube Maker (2)	1,400	--
Autoclave (bench type)	1,295	--
Sterile Transfer Hood	500	--
Shaker and Carrier	800	--
Water Bath	300	--
Freeze Dryer	--	1,800
Automatic Pipette	515	--
Hot Plate with Magnetic Stirrer (3)	750	--
Compound Microscope	2,500	--
Distill for Water	1,250	--
Knapsack Sprayer (4)	600	--
Incubators (2), Low Temp., BOD	1,800	--
Incubators (2), above	1,200	--
Seed Dryer	500	
Drying Ovens (2)	2,200	--
Lab Balance, Top Loading (2)	1,800	1,800
Field Balance (2)	1,000	--
Portable Leaf Area Measuring Apparatus	575	--

Item	U.S. Dollars 1979	1981
Flourescent Lamps and Racks	$ 500	$ --
Transfer Chamber	400	
Microscope Illuminator	100	
Specimen Holders	100	
Stereo Microscope	800	
Portable Water Reservoirs (2)	1,000	
Soil-water Potential Measuring Apparatus	2,000	
Electronic Moisture Tester for Seeds	1,000	
Vacuum Pump and Traps	400	
Buchner Evaporator with Caps and Tubes	400	
D.B.C. Kits (2)	4,200	
Shaker Heavy-duty, Box Type	500	
Extractors, Sochlet Type	350	
Heating Mantels (3)	180	
Sochlet Heaters (6)	350	
U.V.-Vis Spectrophotometer + Cells	2,400	
Deionizer Water System + 4 Cartridges	250	
Burettes, Automatic (2)	90	
Chromatograph (LTC accessories)	400	
Micro Kjeldahl Units + Auto Transformers (2)	300	
Pump, Water Circulating for Kjeldahl	140	
Manostat Minipets (10 ml capacity)	50	

Item	U.S. Dollars 1979	1981
Accessories for IEC Model K Centrifuge	$ 1,000	$ --
Tape Recorders (2) + Tapes (18)	600	
Movie Projector, 8 mm	1,500	
Slide Projectors (1) + Trays (36)	800	
Camera, 35 mm with Macro Lens	700	
Screens for Projector (1)	200	
Calculators (15) @ $60	900	
Computer, Hewlett Packard Model 9845 + Accessories, or equivalent	50,000	
Total U.S. Price (FOB)	92,595	4,600
Transportation and Handling (1.92)	177,782	8,832
Total CIF Kenya Price	$270,377	$13,432
Inflation and Contingency 10%	27,037	1,343
	$297,414	$14,775

103

EQUIPMENT EXPENDITURES FOR USAID PURCHASE IN KENYA

Item	U.S. Dollars 1979	1981
House Pre-Fabricated or Mobile Home(s), Four-Bedroom (Furnished)	$ 40,000	$
Tractor, 45 Hp*	11,000	
Disc Plow	1,600	
Disc Harrow	1,410	
Tiller	1,210	
Subsoiler, Single Tine	410	
Cultivator	1,740	
Fertilizer Distributor	475	
Mounted Sprayer (400 gal)	2,300	
Land Rover-type Vehicles, Long-wheel Base, 4-wheel Drive (3)**	34,846	
Land Rover-type Vehicles, Long-wheel Base, 4-wheel Drive (2)**		22,846
Van, 9 Passenger, 2-wheel Drive** (1)	13,135	
Sedan, 6 Passenger, 2-wheel Drive** (1)	9,474	
Spare Parts for Vehicles and Farming Equipment	20,000	
Total	$137,600	$22,846
Inflation and Contingency 10%	13,760	2,284
	$151,360	$25,129

* Tractors and accessories manufactured by two U.S. companies (John Deer, International Harvester) are available in Nairobi. Recommend local purchase to insure availability when technicians arrive. Parts and services are available in Nairobi from the dealers.

** Recommend purchasing non-U.S. manufactured vehicles listed above because of availability of parts and services in Kenya, especially in remote areas where Team will be working extensively. Also, purchase in Kenya will insure availability when technicians arrive. A similar request for a procurement source waiver was previously approved (reference Procurement Waiver Document Number RDOEA 657-761 approved AID/Washington 2/23/76 for purchase of seven Land Rovers for East African Food Crops Research Project, Number 618-11-110-657.

All vehicles should be equipped with right hand drive and manual transmission.

APPENDIX VIII 2(e) USAID FURNISHED EXPENDABLE MATERIALS AND SUPPLIES

	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	Total
Fertilizer & Pesticides	$ 2,250	$	$	$	$	$	$ 2,250
Field Supplies (small hand tools, etc.)	800						800
Greenhouse Supplies	1,500						1,500
Machinery & Equipment Maintenance	2,000						2,000
Laboratory Chemicals	2,200						2,200
Glassware, Hoses, etc.	6,000						6,000
Culture Media	800						800
Field Tubing	1,500						1,500
Dessicator Jars, Soil Cans	1,800						1,800
Computer Software	2,000						2,000
Aerial Photography	200						200
Field Tapes, etc.	1,500						1,500
Laboratory & Office Supplies	1,500	3,000	3,000	3,000	3,000	1,500	15,000
Subtotal	24,050	3,000	3,000	3,000	3,000	1,500	37,550
Shipping Charges 1/	11,063	1,380	1,380	1,380	1,380	690	17,273
Total	35,113	4,380	4,380	4,380	4,380	2,190	54,823
Inflation and Contingency 10%	3,511	438	438	438	438	219	5,482
	$38,624	$4,818	$4,818	$4,818	$4,818	$2,409	$60,305

APPENDIX VIII 2(f) PROJECT EVALUATION

FY 1981	$125,000
FY 1984	75,000
	$200,000

Evaluations

FY 1981 - 7-man team for 1½ months at $11,900 per month

FY 1983 - Funded by FAO

FY 1984 - Jointly funded:

$75,000	AID
75,000	FAO
$150,000	

FY 1984 - AID portion of 4-man team for approximately 1½ months at $11,900 per month

Cost Per Month	
Salary $150 per day (30 days)	$4,500
Transportation	2,000
Per diem	1,900
Travel in country	2,000
Insurance and passport	100
Miscellaneous costs	1,400
	$11,900

GOVERNMENT OF KENYA CONTRIBUTION

	Contribution per GOK Estimate (Amount in Kenya Pounds per GOK Fiscal Year)					
	79/80	80/81	81/82	82/83	83/84	Total
Personnel Costs	116,524	127,600	139,600	151,600	163,600	698,924
Participant Training	6,400	6,800	7,200	7,600	8,000	36,000
Travel and Per Diem	8,570	8,970	9,370	10,400	11,100	48,410
Equipment	2,750	2,800	2,850	2,900	2,950	14,250
Expendable Supplies	4,800	5,000	5,200	5,400	5,600	26,000
Rental-Land and Building	7,120	7,120	7,120	7,120	7,120	35,600
Administrative Support	63,000	59,400	69,000	69,500	72,000	332,900
	209,164	217,690	240,340	254,520	270,370	1,192,084

GOK estimated costs are in Kenya Pounds.

GOK costs are converted to U.S. Dollars at a rate of 1 Kenya Pound = 2.68 U.S. Dollars.

GOK cost totals are also converted to agree with U.S. Fiscal Years.

GOK Contribution in U.S. Dollars Per USAID/K Fiscal Year						Total GOK Contribution
FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	
$ 78,204	$320,250	$350,603	$382,819	$415,034	$329,395	$1,876,305
4,295	17,450	18,523	19,598	20,671	16,107	96,644
5,752	23,275	24,349	25,84[illegible]	28,386	22,342	129,949
1,846	7,416	7,551	7,684	7,819	5,939	38,255
3,222	13,020	13,557	14,094	14,632	11,275	69,800
4,779	19,114	19,114	19,114	19,114	14,335	95,570
42,282	166,712	165,906	185,570	188,255	144,967	893,692
$140,380	$567,237	$599,603	$654,724	$693,911	$544,360	$3,200,215

SUMMARY OF TOTAL PROGRAM
(In U.S. Dollars)

	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	TOTAL
AID	840,348	1,030,118	1,261,022	1,091,718	1,091,718	688,359	6,003,283
GOK Support of AID	140,200	567,237	599,603	654,724	693,911	544,360	3,200,035
FAO	28,510	437,970	804,160	757,600	800,510	821,620	3,650,370
GOK Support of FAO	116,786	1,856,054	759,672	571,549	510,878	350,358	4,165,297
	1,125,844	3,891,379	3,424,457	3,075,591	3,097,017	2,404,697	17,018,985

SUMMARY OF COST ESTIMATE AND FINANCIAL PLAN

Project Inputs	AID		GOK Support of AID		Total Project		FAO		GOK Support of FAO		Total Program		Total Program Costs
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	
Personnel	3,551,000	60,000	-	1,876,305	3,551,000	1,936,305	2,931,470	44,000	-	626,287	6,482,470	2,606,592	9,089,062
Participant Training	1,042,000	30,000	26,000	70,644	1,068,000	100,644	316,400	10,500	-	-	1,384,400	111,144	1,495,544
Travel and Per Diem	34,000	44,000	-	129,769	34,000	173,769	48,000	-	-	129,933	82,000	303,702	385,702
Equipment	306,537	160,444	-	38,255	306,537	198,699	150,000	50,000	-	653,020	456,537	901,719	1,358,256
Expandable Supplies	54,823	-	-	69,800	54,823	69,800	-	100,000	-	243,235	54,823	413,035	467,858
Project Evaluation	200,000	-	-	-	200,000	-	-	-	-	-	200,000	-	200,000
Rental of Land & Bldgs	-	-	-	95,570	-	95,570	-	-	-	1,545,772	-	1,641,342	1,641,342
Admin. Support	-	-	-	893,692	-	893,692	-	-	-	967,050	-	-	1,860,742
Inflation & Contingency	495,435	25,044	-	-	495,435	25,044	-	-	-	-	495,435	25,044	520,479
TOTAL	5,683,795	319,488	26,000	3,174,035	5,709,795	3,493,523	3,445,870	204,500	-	4,165,297	9,155,665	6,002,578	17,018,985

BUDGET COVERING THE GOVERNMENT OF KENYA CONTRIBUTION (K£)*

FOR THE UNDP/FAO DRYLAND FARMING RESEARCH AND DEVELOPMENT PROJECT

a) Staff on Post

	1978/79	1979/80	1980/81	1981/82	1982/83	Total
1 Senior Res. O/I	2,334	2,424	2,514	2,604	2,712	12,588
1 Res. Officer I	1,794	1,866	1,938	2,010	2,082	9,690
3 Res. Officers II	4,662	4,842	5,022	5,202	5,382	25,110
1 Senior Techn. Officer	1,446	1,494	1,554	1,614	1,674	7,782
6 Techn. Officers	7,020	7,272	7,524	7,812	8,100	37,728
16 Techn. Assistants	10,272	10,656	11,040	11,424	11,904	55,296
1 Executive Assistant	1,350	1,398	1,446	1,494	1,554	7,242
1 Artisan (Mason)	531	552	573	594	618	2,868
3 Drivers	1,593	1,656	1,719	1,782	1,854	8,604
48 Subordinate Staff	12,240	12,672	13,248	13,824	14,400	66,384
81 TOTAL	43,242	44,832	46,578	48,360	50,280	233,292

b) Additional Staff Requirements

1 Asst. Director of Agric.	2,712	2,820	2,928	3,036	3,144	14,640
1 Senior Res. Officer	2,154	2,244	2,334	2,424	2,514	11,670
10 Res. Officers	14,460	14,940	15,540	16,140	16,740	77,820
4 Techn. Officers	4,680	4,848	5,016	5,208	5,400	25,152
10 Techn. Assistants	6,420	6,660	6,900	7,140	7,440	34,560
2 Shorthand Typists	1,728	1,800	1,872	1,944	2,016	9,360
3 Copy Typists/Tel. Oper.	1,926	1,998	2,070	2,142	2,232	10,368
1 Executive Officer	1,170	1,218	1,266	1,314	1,362	6,330
1 Senior Mechanic	864	900	936	972	1,008	4,630
3 Mechanics	1,593	1,656	1,719	1,782	1,654	8,604
5 Clerical Officers	3,210	3,330	3,450	3,570	3,720	17,280
1 Storeman	642	666	690	714	744	3,456
3 Artisans (Carpenters)	1,594	1,659	1,719	1,782	1,854	8,608
5 Drivers	2,655	2,760	2,865	2,970	3,090	14,340
30 Subordinate Staff	7,650	7,920	8,280	8,540	9,000	41,490
1 Assistant Storeman	531	552	573	594	618	2,868
81 TOTAL	53,989	55,971	58,158	60,372	62,736	291,226

c) Additional Estimates

Transport	2,400	5,000	5,000	5,000	5,000	22,400
Travelling	2,000	6,000	6,000	6,000	6,000	26,000
Farm Input	1,000	11,000	12,000	12,000	12,000	48,000
Office Equipment	1,000	1,500	1,500	1,500	1,000	6,500
Uniforms	400	1,450	1,500	1,500	1,500	6,350
Physical Plants	6,000	20,000	10,000	6,000	6,000	48,000
Workshop Equipment	-	50,000	20,000	5,000	5,000	80,000
Scientific Equipment	-	6,000	6,000	6,000	6,000	24,000
Buildings	50,000	404,120	68,220	38,700	14,760	575,800
Farm Development	2,000	10,000	10,000	5,000	5,000	32,000
Maintenance of Station	5,000	8,000	8,000	8,000	8,000	37,000
Miscellaneous	6,980	52,307	14,822	9,470	7,026	90,605
Farm Equipment	-	15,200	15,200			30,400
TOTAL	76,780	575,377	163,042	104,170	77,286	
GRAND TOTAL						1,027,055

Total Kenya Government Estimated Contribution = K£ 1,551,573

*K£ = 2.68 U.S. Dollars

11/12

APPENDIX IX

CONTRIBUTION OF HYBRID MAIZE IN KENYA OVER THE LAST 10 YEARS

TABLE: Total Sales of Hybrid Seed Maize 1967/68 - 1976/77 (100 Kg. Units)

	611	612	613	614	622	632	511	512	X105A	TOTAL
1967/68	2,289	6,689	6,689	-	1,158	3,167	283	-	-	19,728
1968/69	2,631	1,722	11,271	-	3,246	3,966	479	-	-	23,314
1969/70	2,046	3,269	16,824	-	3,689	4,494	1,683	74	-	32,078
1970/71	3,926	3,074	22,723	-	8,987	5,599	2,046	1,554	-	47,908
1971/72	6,709	5,384	30,110	-	7,066	8,381	2,447	2,114	-	62,211
1972/73	5,524	7,898	42,086	-	5,068	5,258	3,072	2,544	-	71,450
1973/74	5,265	8,923	42,022	614	6,006	4,656	388	6,508	102	74,474
1974/75	6,200	16,666	44,513	5,989	5,403	3,900	1,479	6,226	97	90,472
1975/76	6,072	7,005	36,764	33,690	7,710	4,276	4,929	6,423	131	106,999
1976/77	4,136	11,548	16,531	63,991	8,240	3,722	6,191	7,729	152	122,240

According to estimates of the Kenya Seed Company, production total (122,240) for 1976/77 represents approximately 20 percent of the hybrid seed maize produced over the period 1967/68 to 1976/77. The estimated acreage of maize in production 1976/77 is 1,528,000 acres (which in 1976/77 produced 2,292,00 tons at 1.5 tons/acre). Calculating 20 percent of the total 1976/77 production gives 458,400 tons which at $100 per ton gives $45.8 millions.

Source: Kenya Seed Company, Kitale Kenya

APPENDIX X

Job Descriptions for USAID Technicians to be recruited for the USAID/Kenya Government Research Team on Research and Development of Agricultural Systems for Semi-Arid Areas

1. Agrometeorologist

Qualifications - PhD in agricultural meteorology or soil science with thorough working knowledge of soil-water-plant relationships. A minimum of five years experience in research planning and coordination involving crop growth, soil water and climatological monitoring and analysis is an essential requirement for this position. Experience in planning and execution of a field research programme with an applied orientation is essential.

Duties - The agrometeorologist will work as part of a USAID/Kenya research team whose main objective will be to develop cropping systems for marginal rainfall areas of Kenya. The main responsibility for this post will be to determine through experimentation the water requirement/yield relationships for the different crops and varieties, especially maize, sorghum, pidgeon peas, beans etc which appear suited to dryland agriculture, to compile rainfall and evaporation data for dryland areas, as a guide to soil moisture status to be expected in different locations and finally to develop a series of recommendations on crops to be incorporated in agronomic packages and criteria for determination of optimum use of supplemental irrigation where such capacity exists. An essential component of these duties is the training of Kenyan staff in these techniques so that they can continue the work on expiry of the project. In the performance of the above duties, it will be necessary to develop effective liaison with the Meteorological Service, University of Nairobi, FAO and Ministry of Agriculture staff who will be addressing various aspects of the overall research programme.

Location - The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will however be provided for establishing and travelling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

2. Agronomist

Qualifications - PhD degree in agronomy, preferably in crop production. A minimum of five years experience in basic as well as applied agronomic research involving cereals and legumes is essential, and a demonstrated ability to work within a multidisciplinary research team would be an advantage. A broad but thorough knowledge covering the fields of plant physiology and crop ecology is essential for this post.

Duties - The agronomist will work as part of a USAID/Kenya Research Team whose objective will be to develop cropping systems for the marginal rainfall areas of Kenya. The main responsibilities of this post will be to participate in the screening programme for as many varieties as possible of cereals and legumes, especially sorghum, pigeon peas, cowpeas, beans, etc., for drought tolerance characteristics. An important aspect of this programme will be to develop techniques for identification of both drought tolerance and yield potential in plants as early as possible in their life cycle. This would reduce the expensive observational period and thus increase the number of varieties which can be evaluated in a given time. The agronomist will also investigate agronomic compatibility of various combinations of crops and in cooperation with the agrometeorologist and other program scientists develop recommendations for agronomic packages which use intercropping and relay cropping to minimise risk of crop failure and maximise optimum use of available soil moisture.

An essential component of these duties is the training of Kenyan personnel in the techniques involved so that such staff can continue the research and development programme on the expiry of the project. The agronomist will also be expected to develop a good working relationship with the FAO, University of Nairobi and Kenya Government research staff in the programme and establish strong linkage with research staff in international and other institutes who can supply materials for local trials and adaptation.

Location - The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will however be provided for establishing and travelling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

3. Soil Physicist

Qualifications - PhD degree in soil science or comparable degree in related field with emphasis on soil physics. A minimum of five years experience in laboratory and field techniques for determination of soil physical characteristics related to water infiltration, water retention and plant root development.

Duties - The soil physicist will work as part of a USAID/Kenya team on problems of water conservation in dryland agriculture in Kenya. The main responsibility for this post will be to study in detail the effects of various forms of soil conservation measures taken on the soil moisture regime, to study the effects of different tillage practices on the soil structure, rainfall acceptance and water holding capacity of the soil and to cooperate with agricultural engineering and soil conservation teams in drawing up tillage recommendation to be incorporated in agronomic packages.

An important aspect of these duties will be to train Kenyan personnel in the application of soil physics techniques at both field and laboratory level as an essential long term component for monitoring the changes under the dryland farming research and development programme.

Location - The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will however be provided for establishing and travelling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

4. Senior Maize Breeder

Qualifications - PhD degree in Plant breeding or genetics with at least 10 years experience in cereals breeding including maize. The position requires several years experience in planning and directing a breeding programme, preferably with an inter-disciplinary emphasis. It is expected that the holder of this post will be in a senior leadership position in his organization.

Duties - The maize breeder will work with senior maize breeder in Kenya and provide much needed technical guidance for a coordinated maize breeding programme covering all ecological zones but with emphasis on improvement of maize yield in low altitude/high temperature areas, incorporation of disease resistance and improvement of agronomic characteristics. Other duties of this post include organization of training seminars on maize improvement, supervision of the Protein Quality Laboratory and collaboration with the plant pathologist incorporation disease resistance in maize and other crops. It is expected that the holder of this post will have a strong input in the research team for marginal rainfall areas and should be prepared to cooperate with other participants from FAO, University of Nairobi and Kenya Government. A major aspect of the duties of this post is to develop a team of well trained local maize breeders capable of pursuing a continuous maize improvement programme.

Location - The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will however be provided for establishing and travelling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

5. Maize Breeder

Qualifications: Ph.D. degree in plant breeding on genetics with at least five years experience in cereals breeding including maize. The position requires experience in developing breeding methods to incorporate characteristics developed through interdisciplinary cooperation to enhance production, protein quality, disease resistance and other factors with particular reference to optimal production in marginal rainfall areas. Must have ability to work as a member of a team working toward a common objective.

Duties : The maize breeder will work with a more senior U.S. maize breeder as well as other maize breeders in Kenya and provide needed technical guidance for a coordinated maize-breeding program covering all ecologic zones including low altitude/high temperature areas. He will also spend up to half his time working in higher elevations/high production potential areas of Kenya with particular emphasis at the Kitale Research Station. The breeder will focus attention on incorporation of disease resistant, protein quality and improvement of agronomic characteristics. He will work closely with the protein quality laboratory at Kitale.

Other duties of this post include participation in training seminars on maize improvement. A major aspect of the duties will be to develop a team of well-trained local maize breeders, capable of pursuing a continuous maize improvement program. The breeder will work closely with other program participants from FAO, the University of Nairobi and the Kenya Government to integrate technical improvement packages and to select and train local scientists.

Location : The occupant of this post will live in Kitale and work out of the Kitale Research Station. Facilities will, however, be provided for establishing and traveling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

6. Plant Pathologist

Qualifications - PhD degree in plant pathology with ability to identify and work with all types of pathogens. A minimum of five years experience in the applied aspects of plant pathology, preferably with an interdisciplinary approach is required. Familiarity with breeding disease-resistant varieties is desirable but leadership ability, ability to work within a research team and experience in planning and conducting applied research are essential.

Duties - The pathologist will work with Kenyan plant pathologists in monitoring disease problems of economic concern and with breeders to develop techniques and screening for disease resistance, especially virus diseases. An important aspect of these duties will be to train local staff in identification and survey techniques for virus diseases of crops and the study of alternative host ranges for important plant diseases as an aid to development of agronomic practices. In particular the pathologist will have an input in the marginal rainfall areas study team in the development of cropping systems which minimise the carry over and aggravation of plant diseases. It is expected that the overall activities of the plant pathologist will lead to a scheme for assigning priorities on study and control of diseases affecting crops, especially cereals and legumes, a team of local staff capable of continuous evaluation of economic status of plant diseases and some crop varieties showing resistance to disease, especially maize streak.

Location - The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will however be provided for establishing and travelling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

(8)

7. Agricultural Economist

Qualifications: Ph.D. in Agricultural Economics with a minimum of five years experience in research planning and coordination. Experience with agricultural applications of linear programming, farm management and production economics is essential. Experience in economic training and familiarization with U.S. training institutions is highly desirable.

Duties

The agricultural economist will work as part of a USAID/Kenya research team whose main objective will be to develop cropping systems for marginal rainfall areas of Kenya. The secondary responsibility for this post will be to assist the Director of the Kenya Agricultural Research Institute (KARI) in establishing a separate Division of Agricultural Economics as KARI. This Division will work with the other scientists at KARI helping them evaluate the economic merits of their projects. This work will include but not be limited to (a) collecting relevant input-output data for each project at KARI; (b) analysis of the data in terms of developing functional relationships between physical output and relevant economic inputs; (c) work with the scientists in developing experiments and in making recommendations to the MOA extension staff; (d) in cooperation with the other scientists make suggestions for further research; and (e) provide the necessary training for agricultural economists at the other experiment stations.

The agricultural economist will also be responsible for developing liaison between KARI and other research stations, the Ministry of Agriculture, and other research institutes in Kenya such as CIMMYT. One of the critical needs is to provide on-the-job training for the agricultural economists at all of the research stations and the Ministry of Agriculture. The senior agricultural economist at KARI will assume responsibility for providing leadership in this important training area, using the agricultural economics division at KARI to train the agricultural economists so they can more effectively conduct research at their respective stations using appropriate analytical tools. The training will be accomplished using both workshops and seminars as appropriate.

The USAID Economist will collaborate with the FAO funded Economist in establishing a Kenya specific socio/economic data bank utilising the Farm Management Data Collection and Analysis System developed by the Farm Management Division FAO/Rome.

7. Agricultural Economist (continued)

Location

The occupant of this post will live in Nairobi and work out of ARD/KARI at Muguga. Facilities will, however, be provided for establishing and traveling to experimental plots in suitable areas within the Republic and considerable local travel is envisaged. This person will report through the appropriate channels to the Director of ARD/KARI as well as to the contract Team Leader.

123

Job Descriptions for UNDP/FAO Technicians to be recruited for UNDP/FAO Kenya Government Research Team on Dryland Farming Research and Development

Staff Duties & Qualifications	Starting Date	Duration
(i) Project Manager/Soil Management Specialist	May 1979	53 mm

Postgraduate qualifications in soil science with at least 10 years of active research in excess of postgraduate training. The candidate should have special competence in soil water conservation in relation to plant growth, and should have had the experience of working with a multidisciplinary team in the problem area of dryland farming. Previous experience in the developing countries of the Semi-Arid Tropics would be advantageous, but not essential. The officer will be administratively responsible to UNDP/FAO for the Project and will co-ordinate all Project activities and establish mutually beneficial liaison with other institutions and agencies engaged in different aspects of dryland farming research. He will be professionally responsible for the research sub-programme on soil water conservation and crop water use as detailed in the Work Plan.

Staff Duties & Qualifications	Starting Date	Duration
(ii) Agronomist/Cropping Systems	December 1978	53 mm

Postgraduate qualifications in agronomy with at least 5 years of demonstrated competence in cropping systems research under limited moisture regimes. Experience with mixed cropping in developing countries of the Tropics is highly desirable. His duties will include testing food crop varieties (cereals, legumes and oil crops) under conditions of limited moisture to develop appropriate cultural practices in land preparation and cultivation, that optimise crop water use such that crop failures can be minimised. This is a key position, and the agronomist will be expected to work closely with the plant breeder, soil physicist, plant physiologist and agro-economist especially in the design and execution of pre-extension trials.

Staff Duties & Qualifications	Starting Date	Duration
(iii) Agronomist/Physiologist	October 1979	47 mm

Postgraduate qualifications in agronomy with special emphasis on physiological reactions of plants to water and nutritional stress. The Physiologist will provide comparative information on crop water requirements at various stages of growth with a view to locating the most vulnerable stages of productivity. He will initiate studies to identify varietal characteristics such as rooting ability and leaf geometry which may be associated with drought tolerance. For instance, there is need to confirm observations that hybrid sorghum does better than pure line varieties under moisture deficient conditions in East Africa. The Physiologist will work closely with the breeders and advise on selection criteria for drought tolerance.

Staff Duties & Qualifications	Starting Date	Duration
(iv) Plant Breeders (2)	October 1979	93 mm

Postgraduate qualifications in genetics and plant breeding. The candidates should have at least 5 years' practical experience in field crop improvement with special reference to tropical cereals, food legumes and oil crops. Broadly based experience with major food crops and their global germ plasm sources would be an added advantage.

The breeders will be responsible for breeding, selection and testing of drought tolerant varieties of main food crops including maize, food legumes (pigeon pea, chick pea, cow pea), cassava, sweet potato and other crops that show promise for marginal rainfall areas. They will be expected to carry out exploratory work on other crops of potential significance in marginal rainfall areas.

121

Staff Duties & Qualifications	Starting Date	Duration
(v) Plant Protection Expert	October 1979	51 mm

Postgraduate qualifications with entomology as the principal subject. The candidate should have had sound basic training in plant protection and should be conversant with a wide range of field crop pests including insects, nematodes, birds and rodents. At least five years' experience of independent research on the control of a major plant pest is required. Previous experience with pest problems of small subsistence farmers in a developing country would be an advantage. The principal responsibility of the pest control expert will be to determine the extent to which various types of pests limit crop production in marginal rainfall areas at various stages of production. He will be expected to make recommendations on appropriate ways of minimising crop losses due to pests, and to assist breeders and agronomists in selecting crop varieties with pest resistant characteristics. A survey designed to monitor any changes in pest variety and population in response to changing cropping patterns will be initiated.

Staff Duties & Qualifications	Starting Date	Duration
(vi) Animal Nutritionist	January 1978	50 mm

Postgraduate qualifications in animal nutrition with emphasis on ruminants. The candidate should have had a good background in animal production at the basic degree level to enable him to be conversant with a wide spectrum of stock production. Some experience in pasture agronomy in the tropics is desirable. The officer will be principally concerned with identifying the role of livestock production in marginal rainfall areas both on small and larger farm units. He will gather information on how animals and crops compete for limited farm inputs and their relative benefit to the farmer. Lack of sufficient fodder during droughts severely impeded animal performance. The nutritionist will be required to give particular attention to methods of supplementation using crop residues to maintain growth when natural pastures are limited. For the larger farm units, the nutritionist will (a) evaluate pasture species for use in reseeding to ensure rapid recovery of overgrazed areas and (b) carry out agronomic research on potentially useful dry season supplementation crops. He shall carry out appropriate analytical experiments (proximate, in vitro, in vivo and feeding trials) to determine the nutritive value of pasture grasses, forages, fodder crops and other feeding stuffs.

1-29/80

Staff Duties & Qualifications	Starting Date	Duration
(vii) Farm Management Economist	July 1979	50 mm

Professional postgraduate qualifications in agricultural economics. He should have considerable experience in working with agriculture scientists on a wide range of production problems. Previous experience with small mixed and multi-cropping systems in developing countries of the tropics is highly desirable. The research economist will work under the direction of the Project Manager, but his work will be an integral part of an economics analysis capacity to be established in the Scientific Research Division of the Ministry. He will work closely with crop and animal scientists in the following areas:

a) identification of problems potential for achieving better labour productivity and greater income stability by management changes in major crop and animal enterprises.

b) provision of information on farm management practices which should be used as controls in experiments.

c) determination of treatment levels consistent with farmers' labour and cash availability.

d) provision of data base for siting experiments rationally.

The economist will provide leadership for labour recording in experimental plots and under farm conditions, and with this information he will give a practical farm viewpoint interpretation of experimental results. He will be responsible for monitoring adoption rate by farmers and for providing feedback information on package components for further research. He will be closely involved in the design, execution and interpretation of pre-extension trials on unit farms and farmers' fields.

PROJECT IMPLEMENTATION SCHEDULE

Time Phasing of Current USDA/PASA Technicians
and Proposed Expanded USDA/PASA Personnel Assigned to the
Food Crops Research Project

U.S. CONTRACTOR PERSONNEL*	CY 1978 Q2 Q3 Q4	CY 1979 Q1 Q2 Q3 Q4	CY 1980 Q1 Q2 Q3 Q4	CY 1981 Q1 Q2 Q3 Q4	CY 1982 Q1 Q2 Q3 Q4	CY 1983 Q1 Q2 Q3 Q4	CY 1984 Q1 Q2 Q3 Q4
Plant Breeder Maize/Team Leader	USDA	----------	----------	----------	USDA	----------	----------
Maize Breeder	USDA	----------	----------	----------	"	----------	----------
Agronomist	USDA	----------	----------	----------	"	----------	----------
Agrometeorologist	USDA	----------	----------	----------	"	----------	----------
Soil Physicist	USDA	----------	----------	----------	"	----------	----------
Agricultural Economist	USDA	----------	----------	----------	"	----------	----------
Plant Pathologist	USDA	----------	----------	----------	"	----------	----------
Plant Quarantine	USDA	----------					

*Counterpart personnel will be assigned by the GOK for each of these positions beginning August 1979 and extending through 1983.

DETAILED IMPLEMENTATION SCHEDULE - AID PROJECT

Activity	Time Frame	Responsible Agency
Project Paper submitted to AID/W	April 1979	USAID
Project Agreement between countries	June 1979	USAID/GOK
Select team leader and technicians	June 1979	USDA/USAID/GOK
FIRST YEAR		
Arrival of team leader	August 1979	USDA
Order 5 vehicles, supplies, support equipment, furniture	August 1979	USDA
Arrival of 4 USDA technicians (see flow chart)	September 1979	USDA
Appointment of counterpart personnel	September 1979	GOK
Develop linkages and work plans	October 1979	USDA
Assess need for TDY personnel	November 1979	GOK/USDA
Initiate research	November 1979	USDA
Select 5 diploma-holding students for B.Sc. training in U.S.	November 1979	GOK/USAID/USDA
Select students and prepare PIO/Ps for 2 structured and 2 professional development programs abroad	December 1979	GOK/USAID/USDA
Initiate seminars in Kenya (to continue through life of project)	December 1979	GOK/USDA
Organize workshop(s)	December 1979	GOK/USDA
Submit annual reports - technicians	December 1979	USDA

Note: Assumes timely availability of AID funds early in FY 79.

SECOND YEAR

Prepare annual project report - Team Leader	January 1980	USDA
Select students and issue PIO/Ps for training 8 M.Sc. in U.S.; 3 M.Sc. in Kenya and 5 B.Sc. (diploma-holding) students in U.S.	January 1980	GOK/USAID/USDA
Assess needs for TDY personnel	March 1980	GOK/USDA
Select students and prepare PIO/Ps for 2 structured and 3 professional development programs abroad	July 1980	GOK/USAID/USDA
Organize workshop(s)	November 1980	USDA
Submit annual reports - technicians	December 1980	USDA

THIRD YEAR

Prepare annual project report - Team Leader	January 1981	USDA
Review progress and revise work plans (team)	January 1981	USDA
Select 3 students for Ph.D. training in U.S. and prepare PIO/Ps	January 1981	GOK/USAID/USDA
Fiscal Audit	February 1981	USAID
Order additional equipment and vehicles	February 1981	USDA
In-depth review of technical progress by outside evaluation team	February 1981	GOK/USAID/USDA/FAO
Assess needs for TDY personnel	March 1981	GOK/USDA
Select and issue PIO/Ps for 2 structured and 4 professional development programs abroad	July 1981	GOK/USAID/USDA
Organize workshop(s)	November 1981	USDA
Submit annual reports - technicians	December 1981	USDA

FOURTH YEAR

Prepare annual project report - Team Leader	January 1982	USDA
Select students and issue PIO/Ps for 7 M.Sc. in U.S.; 2 M.Sc. in Kenya; and 5 B.Sc. (diploma-holding) students in U.S.	January 1982	USDA
Fiscal Audit	February 1982	USAID
Review technical progress	February 1982	GOK/USAID/USDA
Assess needs for TDY personnel	March 1982	GOK/USDA

Select and prepare PIO/Ps for 2 structured and 4 professional development programs abroad	July 1982	GOK/USAID/USDA
In-depth review of project by outside review team	July 1982	GOK/USAID/USDA/FAO
Assess and develop, if necessary, revised plan of work for balance of project - Team	August 1982	USDA
Organize workshop(s)	November 1982	USDA
Submit annual reports - technicians	December 1982	USDA
FIFTH YEAR		
Prepare annual project report - Team Leader	January 1983	USDA
Select students and prepare PIO/Ps for 2 structured and 4 professional development programs abroad	January 1983	USDA
Review technical progress	February 1983	USDA
Assess needs for TDY personnel	March 1983	GOK/USDA
Organize workshop(s) - counterparts led	November 1983	USDA
SIXTH YEAR		
Prepare annual project report - Team Leader	January 1984	USDA
Review technical progress	February 1984	USDA
Organize workshop(s) - counterparts led	March 1984	USDA
In-depth review of project by outside review team	June 1984	GOK/USAID/USDA/FAO
Submit terminal reports - technicians	July 1984	USDA
Prepare terminal project report	August 1984	USDA
Ex post facto evaluation	January 1985	USAID

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

NAME OF COUNTRY : **Kenya**

NAME OF PROJECT : **Research and Development of Agricultural Systems for Semi-Arid Areas**

NUMBER OF PROJECT : **615-0180**

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to Kenya (the "Cooperating Country") of not to exceed Two Million One Hundred and Fifty Thousand United States Dollars ($2,150,000)(the "Authorized Amount") to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The Project will consist of furnishing to the Cooperating Country technical assistance, participant training and supplies, equipment and materials, all designed to assist in development of technological packages benefitting agricultural small-holders in certain arid and semi-arid lands of Kenya. The Project is intended to be one component in a broader program, jointly funded by the Cooperating Country and the Food and Agriculture Organization (FAO) of the United Nations. More specifically, A.I.D. will furnish under the Project, inter alia, a technical assistance team at the Kenya Agricultural Research Institute (KARI) at Muguga, whose emphasis will be on relatively basic research. The FAO will furnish a technical assistance team at the Ministry of Agriculture's research station at Katumani, among whose major concerns will be adaptive research and delivery of the results of that research, through the Kenyan extension service, to drylands small-holders. The A.I.D. Grant will also be available for other forms of assistance, consistent with Project and Program objectives, at the Muguga and related facilities.

I approve the total level of A.I.D. appropriated funding planned for the project of not to exceed Six Million United States Dollars($6,000,000), Grant, including the funding authorized above, during the period FY 1979 through FY 1984, subject to the availability of funds and in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiations and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Goods and Services

Goods and services financed by A.I.D. shall have their source and origin in the United States or the Cooperating Country, except as A.I.D. may otherwise agree in writing. Ocean shipping financed hereunder shall be procured in the United States, except as A.I.D. may otherwise agree in writing.

b. Conditions Precedent

The Project Agreement shall contain conditions precedent in substance as follows:

1. Prior to any disbursement of funds or the issuance of any commitment documents under the Project Agreement, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(a) evidence, in the form of a memorandum of agreement or comparable document, that the UNDP/FAO is committed to funding its components of the program and that such funding and personnel will be available on a basis and at times compatible with the successful and timely implementation of the A.I.D. project;

(b) a plan indicating that all necessary qualified counterpart personnel will be available for the program on a timely basis;

(c) a plan indicating what steps the Cooperating Country will take to assure that persons receiving longterm training will be employed at the KARI, or other acceptable institution, upon completion of such training.

2. Prior to the first disbursement of funds under the Project Agreement for participant training, or to the issuance of any commitment documents with respect thereto, the Cooperating Country will furnish to A.I.D., in form and substance satisfactory to A.I.D., a life-of-project training plan, prepared in collaboration with the project's technical assistance contractor, which will indicate, inter alia, the type and extent of proposed

137

training, justification for this level of training, and such other information as A.I.D. may reasonably require in Project Implementation Letters.

c. Covenants

The Project Agreement shall contain covenants in substance as follows:

1. The Cooperating Country agrees to establish, as part of the A.I.D. project and the program as a whole, a joint FAO/AID evaluation procedure over the life of the project, which will be contained in an annex to the Project Agreement and further elaborated upon in the Project Implementation Letters.

2. The Cooperating Country agrees to provide, on a timely basis, all qualified counterpart and technical personnel required for the successful implementation of the Project. In particular, the Cooperating Country will furnish at least one of the qualified rural sociologists to the UNDP/FAO-funded component of the program, and such supplementary assistance in this discipline as may be required.

3. The Cooperating Country agrees to consult with A.I.D., prior to any change in the present status of KARI as functioning under the direction of the Ministry of Agriculture's Scientific Research Division, concerning the effect of any such proposed change on the implementation of the Project and how any potential adverse effects might be minimized.

d. Waivers

Notwithstanding paragraph a. above, the following waivers to A.I.D. regulations are hereby approved:

1. The requirement set forth in Handbook 1, Supplement B, that commodities procured with grant funds have their source and origin in the U.S., is waived, based upon the justification set forth in Annex XVII to the Project Paper, to permit the procurement of seven Project vehicles, at an approximate cost of $95,000, which have as their source and origin countries included in A.I.D. Geographic Code 935. It is hereby determined that exclusion of procurement of the Project vehicles from countries included in Code 935 would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program; and that special circumstances exist which justify waiver of the requirement of Section 636(i) of the Foreign Assistance Act of 1961, as amended.

2. The requirement set forth in Handbook 1, Supplement B, that commodities procured with grant funds have their source and origin in the U.S. is waived to permit procurement of one 45 horsepower tractor, accessories and spare parts, which have their source and origin in countries included in A.I.D. Geographic Code 935. It is hereby determined that exclusion of procurement of said equipment from Code 935 countries would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program.

5/14/79

Golof T. Butcher
Assistant Administrator
for Africa

STATUTORY CHECKLIST

A. GENERAL CRITERIA FOR PROJECT

1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%)?

1. Standard A.I.D. Congressional notification procedures will be undertaken.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

2. No construction will be financed hereunder. Cost estimates, see Appendix VII, for the project have been found to be reasonable and firm. All requirements of Section 611(a)(1) have been found satisfied.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

3. No further legislative action is required.

4. FAA Sec. 611(b); App. Sec.101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

4. This is not a water or water-related land resource construction project.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?	5. See Appendix XVI.
6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?	6. Project was at one time regional in nature but political differences necessitated its division into country specific components. It is still hoped that, in the future, information gained in the project can be utilized to benefit other countries of the region as well. Assistance is not for benefit of a newly independent country.
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	7. To the extent that research developed under the poject allows Kenya to increase production of food and cash crops, trade and internal competition will be fostered and monopolistic practices weakened. One of the primary objectives of the project is to improve efficiency of agriculture in certain marginal rainfall areas of Kenya.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs	8. U.S. private trade and investment will be encourage to extent that procurement of goods and services is from the U.S.

(including use of private trade channels and the services of U.S. private enterprise).

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

9. Approximately 25% of the program's LC costs will be met by the GOK and approximately 40% of FX costs will be met by A.I.D. The UNDP/FAO is also a major donor to the program, of which the A.I.D. project forms one component.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

10. No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

1. The project is designed to assist, through basic and applied research, in the development of an appropriate technological package benefitting small-holders in certain marginal rainfall areas in Kenya, and to assist in improving the delivery system for implementing that package.

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [Include only applicable paragraph--e.g., a, b, etc.--which

corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

(2) [104] for population planning or health; if so, extent to wh which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

b. (1) The project will finance certain basic research activities related to agriculture in marginal rainfall areas of Kenya. It is one part of a larger program (to which UNDP is another donor) which will develop, field test and adapt research findings so as to maximize utilization by Kenyan extension services and, ultimately, the small-holder. In order to perform such basic research the FAO and A.I.D. technicians will make use of the expressed needs of the small-holders in formulating adaptive technological packages.

It is anticipated that accumulation and dissemination of technical information gained by the program's researchers will benefit the small-holder farmers in the target area and improve the quantity and quality of agricultural production. See generally the detailed project description of the PP.

(a) technical cooperation and development, especially with U.S. private and volunatry, or regional and international development, organizations;

(b) to help alleviate energy problem;

(c) research into, and evaluation of, economic development processes and techniques;

(d) reconstruction after natural or manmade disaster;

(e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished

c. Although this project is part of a larger program funded jointly by the UNDP and the GOK, the GOK's contribution to the program is approximately 25% of total program costs.

(or has the latter cost-sharing requirement beeen waived for a "relatively least-developed country)?

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

d. Not applicable.

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

e. The program focuses on the development of technological packages adapted for use by small-holders in marginal rainfall lands in Kenya. It is anticipated that utilization of these packages will enable the small-holder to increase production of cash and food crops. The small-holder, including women, will benefit through increased production and use of agricultural inputs adapted to conditions in marginal rainfall areas. This will enable the small-holder to participate more fully in the regional or national market economy.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports

f. The essence of this project is to contact the small-holder, ascertain needs in marginal rainfall areas and adapt research accordingly. Additionally, the GOK will be providing technical expertise to the program in

civic education and training in skills required for effective participation in governmental and political processes essential to self-government.	the form of a rural sociologist and other expertise.
g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	g. The project is consistent with several A.I.D. (ASSP and Semi-Arid Lands project) activities and other donor activities. The program will enable the small-holder to increase production and improve the quality of the crops grown. It will, thus, increase production capacities of the small-holder. See Appendix I and II for the project's economic and technical soundness, respectively.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consitent with improving or safeguarding the U.S. balance-of-payments position.	h. U.S. good and services will be utilized to the maximum extent possible.
2. Development Assistance Project Criteria (Loans only)	2. This is Grant assistance.
a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.	

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds $100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

147/148

3. Project Criteria Solely for Security Supporting Assistance — 3. Not applicable

FAA Sec. 531. How will this assistance support promote economic or political stability?

4. Additional Criteria for Alliance for Progress — 4. Not applicable

Note: Alliance for Progress projects should add the following two items to a project checklist.

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

The Standard Item checklist has been reviewed for this project and found current.

149/15.

APPENDIX XV

REPUBLIC OF KENYA

OFFICE OF THE VICE-PRESIDENT AND MINISTRY OF FINANCE

Telegraphic Address:
FINANCE-NAIROBI
Telephone: 334433
When replying please quote
Ref. No. DV.9/179/01
and date

THE TREASURY
P.O. Box 30007
NAIROBI
KENYA

30th April, 19.79

Mr. Glenwood P. Roane,
Director, Mission to Kenya,
P.O. Box 30261,
NAIROBI

Dear Mr. Roane,

The Office of the Vice-President & Ministry of Finance of the Kenya Government hereby formally requests AID assistance in implementing the: Research and Development of Agriculture Systems for Semi-Arid Areas Project. The assistance requested will be as spelled out in the Research and Development of Agriculture for Semi-Arid Areas Project Paper - specifically, to develop through basic and applied research appropriate technologial packages of agricultural recommendations for the small holders in those areas; and to assist in improving the delivery system for implementing those technological packages. The packages to be developed/delivered will include recommended superior crop varieties and cropping systems, optimal planting times, and improved cultural practices.

Additionally, the project will seek to establish within the Kenya Agriculture Research Institute a cadre of Kenyan Research workers and technicians of independently carrying on the project activity. To this end, USAID is requested to finance a major element of training both incountry and abroad (US and other countries) to enable the Kenyan scientists and technicians to acquire the necessary knowledge for solving agronomic problems associated with the semi-arid areas of the country. This assistance is judged necessary and important by the Government to enable it to significantly increase crop yields in the semi-arid areas of Kenya while minimizing the risks of crop failure. Increasingly successful cropping in these areas will enhance agricultural production and improve the general well-being of the rural subsistence farmers residing there.

Project cost estimates, we understand invision an overall program in the magnitude of $.9,203,000, $.6,003,000 of which will be provided by AID and $.3,200,000 by the Government of Kenya. A cost breakdown of Government's commitment to the five year program is enclosed.

Government recognizes the recurrent cost implications of the proposed assistance. We wish to assure AID (subject to approval of annual budget by Parliament) that full consideration will be given to provision of financing needed to meet necessary recurrent costs as well as provision of all other elements of Government support needed for the project. The various Ministries cooperating in the project request that the proposal be submitted to your headquarters for its review and approval and urge that this be done promptly.

Yours sincerely,

(Z.N. Nyarango)
for: PERMANENT SECRETARY/TREASURY

15/1/52

APPENDIX XVI

Kenya: Research and Development of Agricultural Systems for Marginal Rainfall Areas
611(e) Certification

I, Glenwood P. Roane, the principal officer of the Agency for International Development in Kenya, having taken into account, among other things, the maintenance and utilization of projects in Kenya previously financed or assisted by the United States, particularly those in the agricultural and related categories, and the demonstrated capacity and willingness of the Government of Kenya to provide increasing budgetary support for recurrent and development costs incident to the agricultural sector, do hereby certify that in my judgment the Government of Kenya has shown both the financial and human resources capability effectively to maintain and utilize the assistance provided under the proposed project identified above.

Glenwood P. Roane

Date

DETAILED JUSTIFICATION FOR WAIVER

A waiver is requested to permit purchase, probably in Kenya, of certain project vehicles of European origin. More specifically, a total of seven vehicles is recommended for purchase under this project proposal at an estimated cost of $95,000. Five of them would be four-wheel drive utility vehicles, preferably the British-made Landrover, plus one van and one sedan.*

Kenyan vehicular traffic uses the left-hand side of the road so that right-hand drive vehicles (which are very difficult to obtain from U.S. source) are essential. Also, standard U.S. cars, trucks and utility vehicles are dangerous and inefficient on the mountainous, winding roads where they will be required to operate. European, preferably British-manufactured, vehicles would be preferred because much of the automotive equipment will be used in the more remote areas of the country and because of the spare parts available and the ability of local mechanics. In addition, usable vehicles will be transferred to KARI at the termination of the project; those vehicles should complement the existing KARI fleet rather than create a special problem as to spare parts and service.

Possible use on the new project of the vehicles previously purchased for the ongoing project has been considered. It is estimated that of the six Landrovers purchased under the current project, five will be operational at the time the new project begins. Three utility-type vehicles are to be purchased in the first year of new project operation. Two more are scheduled for purchase in the third year. At that time the useful life of all vehicles purchased under the current project will have expired. Therefore, at no one time will there be a surplus of vehicles to meet the needs of the U.S. technicians assigned to the new project.

Based on the foregoing rationale, a waiver is requested of the source and origin requirements contained in A.I.D. Handbook 1, Supplement B, and Section 636(i) of the Foreign Assistance Act to allow procurement of seven project vehicles (approximate cost $95,000) from Code 935 sources rather than the U.S. only (Code 000).

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*The van will be utilized to carry several technicians and their equipment to the research sites at Katumani in order to save operating expenses of individual vehicles. The sedan will be primarily utilized by the team leader in and around Nairobi.

B. Justification for Procurement Waiver for Farm Machinery

A waiver is requested to permit the purchase in Kenya of certain farm machery of non-U.S. origin. Specifically, one 45-horsepower tractor, plus accessories and spare parts are recommended for purchase under this project at an estimated cost of $15,500. In addition to the tractor, one cultivator (approximate cost $1740), one fertilizer distributor (approximate cost, $475), and one 400 gallon mounted sprayer (approximate cost $2,300) would be purchased from the John Deere or International Harvester dealerships in Nairobi. The tractor and equipment are expected to be of West European origin.

The need for a waiver to allow the purchase in Kenya of non-U.S. equipment is based on: (a) availability of dealer servicing and spare parts; (b) familiarity of Kenyan tractor operators with the equipment; and, (c) the need to use available equipment to ensure a prompt project start-up.

There are few tractors of U.S. origin in Kenya and, while very similar, they are not identical to those models currently in use throughout the country. Consequently, there would be problems in providing necessary servicing as the mechanics are unfamiliar with U.S. equipment. More importantly, for only one tractor, no dealer could be expected to stock the spare parts unique to U.S. tractors and equipment. Special ordering each time a particular part is needed will be both burdensome and time-consuming. Thus it is probable the uninformed servicing and a lack of spare parts could result in substantial down-time.

To increase tractor life it is also important that the Kenyan tractor drivers be familiar with the equipment. They are well acquainted with European manufactured equipment and are able to operate them effectively. U.S. produced equipment would be less familiar and subject to a greater probability of ill-use and improper handling.

The first U.S. technicians are expected to arrive in Kenya in October-November 1979 and the fields in which they will be working must be prepared prior to the rains starting in March 1980. If the fields are not prepared by then, an entire year will be lost. Under the best of circumstances, it takes 6 to 9 months for a major piece of farm machinery to be ordered and delivered to Kenya. Thus, approval of the waiver means that as soon as the Project Agreement is signed, the tractor and equipment can be ordered in time to ensure their use in the fields this year.

AID 1020-25 (1-79)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1)	Measures of Goal Achievement: (A-2)	(A-3)	Assumptions for achieving goal targets: (A-4)
Agricultural Sector Agricultural development for increasing production with low capital inputs, raising productive employment, narrowing the urban-rural income gap and contributing to export earnings.	- Continued employment substantial portion of GOK's labor force over the period 1979-1984 (80-85%) - Maintain share of contribution to total GDP (28% , 1977). - Increased value of goods marketed (rate of increase 1970-1976 28%/year. - Decrease the percent (90% in 1975) of smallholders (8 ha or less) with average annual household income ($150 in 1975).	- GOK's Ministry of Agriculture (MOA) statistics and publications. - GOK's Ministry of Finance statistics. - AID project reports.	- Government policy on Agricultural development continues to be favorable. - Agricultural pricing policy be sensitive to production costs in setting prices. - Transportation and other institutional infrastructure (extension, credit, etc.) be improved consistent with farmers' requirements and/or needs. - USAID and USDA provide financial, technical and other support as recommended and on schedule. - US technicians are available and interested in working in Kenya.

AID 1020-2a (1-79)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: (B-1)	Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)	(B-3)	Assumptions for achieving purpose: (B-4)
Combine basic research with applied research in developing technological packages using an integrated systems approach for increasing food production and the welfare of the people in the marginal rainfall areas of Kenya.	- Broad adaptation of improved maize, other cereal and legume varities developed for the marginal rainfall areas (MRAs). - Increased employment of the labor force in the MRAs. - Decreased unemployment and underemployment in the MRAs. - Reduction in male out-migration from the MRAs. - Increased agricultural outputs of the MRAs. - Trained technicians increased in the following areas: - Plant breeding - Soil physics - Plant pathology - Agrometeorology - Agronomy - Agriculture economics	- GOK's statistics and MOA publications. - Annual project reports. - PASA Scientists' USDA/records. - International Center's records (i.e., ICRISAT, CIMMYT, etc.). - University of Nairobi records. - KARI	- Farmers in the MRAs will be responsive and will have correct motivational and aspirational goals. - Government (GOK's) policy remains committed to agricultural development of the MRAs. - GOK will support project, cooperate and collaborate as proposed. - US technicians are available, interested and can assume responsibilities on a timely basis. - Kenyan students are available and interested in overseas training. - USAID will provide financial and technical support timely and effectively. - GOK will provide the counterpart technicians. - Normal weather conditions exist.

(157)

AID 1020-38 (1-78)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: (B-1)	Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)	(B-3)	Assumptions for achieving purpose: (B-4)
	- Improved agrometeorology data based on soil water holding capacity and crop water requirements, etc. - Improved conservation practices and cropping systems adopted by farmers in the MRAs. - Reduced incidence of plant diseases, viruses, and pests.		- GOK's extension services will be effective in disseminating information to farmers of the MRAs. - Transportation and other institutional infrastructure (market, credit, extension) can provide the needed support.

AID 1020-26 (11-73) SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving outputs: (C-4)
- New varieties of maize, other cereals and legumes for the MRAs. - Trained Kenyan technicians in the areas of: - Plant breeding - Agronomy - Agrometeorology - Soil physics - Pathology plant - Agriculture economics within the 5-year period of the project. - Trained Kenyan technicians with degrees at the levels of B.Sc. M.Sc. Ph.D.	- At least one variety of each crop adapted to the MRAs that is resistant to pests and diseases. - At least one variety of each crop suitable for the drier areas (MRAs). - At least one trained technician in each area (C_1). - Eight student/technicians trained to the B.Sc. level. - Nineteen students/ technicians trained to the M.Sc. level. - Four students/technicians trained to the Ph.D. level.	- KARI records. - GOK's MOA records and publications. - Project annual reports. - AID/Kenya reports. - AID evaluation reports. - Contract institution records and publications.	- Normal weather condition prevails. - Kenyan students/technicians are available and interested in training abroad. - GOK will cooperate and collaborate as proposed. - USAID will provide financial and technical support as proposed. - GOK extension service will provide effective delivery system. - GOK's pricing policy will be sensitive to production costs and provide incentive to farmers in MRAs.

AID 1020-25 (1-73)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving outputs: (C-4)
- Professional development of Kenyan staff/technicians during the 5-year period of the project. - Increased employment of the labor force in the MRAs.	- Ten persons receive structured training abroad (30 man-months). - 10 persons receive professional development abroad (30 man-months). - At least 10% decrease in underemployment and unemployment.		

AID 1020-20 (1-73)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

PAG

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving outputs: (C-4)
- Increased agricultural output of the MRAs.	- At least 10 percent increase in output.	Increased output measured by data obtained on selected representative farms.	
- Improved conservation practices and cropping systems adopted by farmers in the MRAs.	- Adoption by at least 50 percent of the farmers in the MRAs.		
- Reduced incidence of pests, plant diseases and viruses in the MRAs.	- Reduction of 50 percent or more.		
- Increase the average annual household income of smallholders (8 ha or less) in the MRAs.	- From 150/year to at least $200 per year.		

16/1/82

AID 1020-26 (1-79)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Research and Development of Agricultural Systems for Semi-Arid Areas

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs: (D-4)
- Seven-man AID/GOK technical staff provided by the USDA to provide the following technical services: -/Plant breeder for conducting breeding program - Plant breeder for conducting breeding program - Plant pathologist for monitoring disease problems - Agronomist for research on cereals and legumes in MRAs. - Agrometeorologist for research on soil and plant water regimes - Soil physicist for research on physical characteristics of soil - Agricultural economist - Backstop TDY personnel providing advisory consultative services.	- Personnel costs USAID - $6,000,000 GOK - $7,400,000 including seven USAID-supported technicians, backstop TDY support staff and GOK counterpart staff and technicians.	- GOK's records and financial statements. USAID records, financial statements, contract, and reports. - Contractor's records and financial statements. - Participating agency records and financial statements. - KARI's reports and financial statements.	- GOK cooperate and collaborat as proposed. - USAID and USDA provide financial and other support as recommended.

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