

West and Central Africa
Maize Collaborative Research Network
(WECAMAN)

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A Proposal Submitted to

United States Agency for International Development
(USAID)

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IIT

by

The International Institute of Tropical Agriculture (IITA)
Oyo Road, PMB 5320, Ibadan, Nigeria

May 1993

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LIST OF ACRONYMS

ACPO	Accelerated Crop Production Officer
COMBS	Collaborative Maize Based Systems, IITA
EEC	European Economic Community
FSR	Farming Systems Research
IARC	International Agricultural Research Center
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IITA	International Institute of Tropical Agriculture
INERA	Institut National d'Etudes et Recherches Agricoles
MSV	Maize Streak Virus
NARS	National Agricultural Research Systems
NE	North-east
OAU	Organization of African Unity
OC	Oversight Committee
SAFGRAD	Semi-Arid Food Grains Research and Development
SC	Steering Committee
SCO	SAFGRAD Coordinating Office
STRC	Scientific, Technical and Research Commission of the OAU
SW	South-west
USAID	United States Agency for International Development
WARDA	West African Rice Development Association
CIDA	Canadian International Development Agency

EXECUTIVE SUMMARY

The International Institute of Tropical Agriculture (IITA) hereby submits a proposal to USAID for funding maize collaborative research activities in West and Central Africa. A two-year grant of \$1,027,500 is being requested to enable IITA continue strengthening the agricultural research and network capabilities of National Agricultural Research Systems (NARS) in the savanna zone of Central and West Africa.

The proposal seeks to:

- a) build on the substantial progress and achievements made by the maize network in SAFGRAD-II with the assistance of IITA;
- b) take into account constraints identified by the SAFGRAD II end of project evaluation, the SAFGRAD Impact Assessment Study and other competent persons;
- c) strengthen the collaboration between the NARS and IITA in the implementation of network activities;
- d) emphasize the growing need for greater utilization of network generated technologies by farmers through effective linkages between NARS scientists and agricultural extension personnel; and
- e) develop the capability within the network to carry out strong, well-balanced collaborative research programs with minimum outside support.

The project strategy is to increase agricultural production and productivity of peasant farmers particularly in the semi-arid zones of sub-Saharan Africa. The purpose is to continue strengthening the NARS within the network countries to: 1) provide high quality research; and 2) generate appropriate technologies for use by farmers of network member countries.

The project, through networking, proposes the following activities: collaborative research projects, regionally-oriented resident research; regional workshops and monitoring tours; development of effective linkages within member countries; development of impact assessment capabilities within member countries; human resource development through seminars and conferences; and collaboration with projects such as the EEC on-farm research project of IITA.

1 Introduction

1.1 *Importance of Maize*

Maize is a major staple crop in most of West and Central Africa. In terms of total hectarage, maize is of lesser importance compared to sorghum and millet in Central and West Africa. In spite of maize's lesser importance in the sub-region, there has been a substantial increase in production in the last two decades (Table 1). The increases in maize production in the savanna belt of West and Central Africa have been achieved at the expense of sorghum and millet hectarages which are being rapidly replaced by maize. Maize may be grown from the humid rain forest zone to the semi-arid sudan savanna and from sea level to over 2000 meters above sea level. It has become very popular among farmers in the sub-region because of its diversified uses (food, feed, industrial use and energy) especially the ease of conversion into local dishes, its flexibility in fitting into the various intercropping systems and its greater yield potential under improved management practices relative to other grain crops.

More than 5 million hectares of maize is cultivated in the sub-region with about 74% of the production used for human consumption. Maize production efforts are intense in the humid coastal forest and the semi-deciduous forest ecology where productivity is limited by high rainfall, high temperature, low solar radiation and the prevalence of severe diseases and insect pests. Small scale farmers predominate and maize is typically intercropped with other food crops. Production in the derived savanna zone has fewer problems with the result that medium-scale cultivators of sole cropped maize are more common. The guinea savanna zone has within the past 15 years witnessed increased maize hectarage. Traditionally, maize

was a minor crop, grown near family compounds where it benefited from regular application of household refuse and organic manure. With high solar radiation and availability of inorganic fertilizers, maize has become important as a cash crop. At present, the derived savanna and the guinea savanna zones of Central and West Africa have the greatest potential for increased and sustainable maize production. Over 50% of the maize production in Central and West Africa is from the northern guinea savanna.

However, maize production is also expanding in the sudan savanna (about 20% of total output) where the early and extra-early maize varieties are becoming increasingly important in filling the hunger gap in July since they become available before sorghum and millet. The savanna zone of West and Central Africa could play a major role in the agricultural development of West and Central Africa since it has the potential to produce a substantial market surplus of maize for use in other agro-ecological zones and for export. For example, the northern guinea savanna zone of Nigeria produces a profitable marketed surplus of maize, which has been the driving force behind the intensification of agriculture in the country.

Table 1. Maize production trends in some countries of West and Central Africa

Country	Production (1990)		Maize area % of cereals 1988/90	Percent of total maize planted to improved varieties in 1988
	x1000 ha	x1000 tons		
Benin	485	455	73	41
Burkina Faso	221	257	8	27
Cameroon	440	600	47	18
Chad	45	31	NA	NA
Côte d'Ivoire	670	530	49	10
Ghana	567	750	47	43
Guinea Conakry	94	108	NA	NA
Mali	126	228	20	36
Mauritania	4	3	NA	NA
Niger	15	80	NA	NA
Nigeria	1500	1600	14	40
Senegal	105	110	5	100 =
Togo	255	245	44	15

1.2 Constraints to maize production in West and Central Africa

The production constraints in West and Central Africa include:

- Unavailability of maize varieties appropriate to the different ecologies and cropping systems.
- Biological stresses.
 - diseases (maize streak virus, rust, blight, Curvularia leaf spot, stalk and ear rots)
 - insect pests especially stem borers, termites, and storage insects
 - parasitic weed, *Striga* spp.
- Drought stress
- Agronomic or crop management constraints

- low soil fertility
- soil-water management problems
- Socio-economic constraints
 - unavailable and expensive inputs,
 - low and unstable price of maize,
 - inadequate or poor seed production and distribution,
 - unavailability and price of credit
 - lack of appropriate on-farm testing,
 - poor transport system
 - annual bush fires
- Inadequate number of trained research scientists, technicians and extension personnel.
- Weak extension services and researcher-extensionist-farmer linkages

2. Why and How Research Can Make a Contribution

2.1 Introduction

The maize network with backstopping from IITA has during the past five years, established an effective collaborative research system with the active participation of NARS of 17 countries in West and Central Africa. The network has significantly improved the professional capacity and confidence of participating national scientists to carry out maize research and have carried out activities aimed at alleviating regional production constraints. The network through the elimination of linguistic barriers among the francophone and anglophone scientists have served as a practical means for establishing constructive relations among national programs. The network has allowed research responsibilities to be shared among NARS scientists, thus minimizing duplication. Through the collaborative research activities,

national scientists have not only improved their research skills, but have also become a source of technology development. New streak resistant, *Striga* tolerant, drought tolerant and high yielding maize varieties and improved agronomic practices have been developed by the network and shared by the network member countries. The network has through biennial workshops, seminars, training and monitoring tours, served as a vehicle for the exchange of germplasm, information and technology. There is a need to continue the strengthening of the research capacity and capability of NARS through the activities of the network. Also, there are a number of maize technologies in the pipeline at both the network and national levels which need to be promoted to ensure the attainment of the goal of self-sufficiency in maize production in the sub-region. The specific areas in which research could make a significant contribution to maize production, productivity and increase in the income of farmers are:

i) *Promotion of the adoption of new maize varieties and crop management practices*

An important area in which remarkable progress has been made by IITA/SAFGRAD is the development of maize varieties with good adaptation to bioclimatic conditions of the semi-arid ecologies and resistance/tolerance to major diseases. In Annex 1, a list of promising technologies in the pipeline at the network level is presented while Annex 2 shows promising varieties which are at various testing stages or are about to be released in member countries of Central and West Africa.

Promotion of the early and extra-early streak resistant varieties and the accompanying crop management practices in the pipeline at the network level or in the member countries of the network, should be vigorously

undertaken by the network. This would ensure the adoption of these improved varieties and the achievement of the goal of food self-sufficiency for the countries in the sub-region.

ii) *Development of Striga tolerant varieties*

One of the major biotic constraints to increased maize production in the semi-arid zone of West and Central Africa is the parasitic weed, *Striga hermonthica*. *Striga* causes not only high yield losses, ranging up to total crop loss, but also it can compel farmers to abandon maize cultivation entirely. The parasite is therefore a big threat to the rapid spread of maize into the semi-arid zone. A moderate level of tolerance has been found in maize which has to be supplemented by other *Striga*-reducing methods. Also, leguminous fodder crops like *Dolichos lablab* or *Aeschynomene histrix* have been identified as potential trap crops, which can additionally increase soil nitrogen content and fodder supply. A *Striga* working group comprised of Ghana, Benin and Cameroon has been assigned *Striga* research responsibilities. The lead centres for *Striga* would be supported to incorporate *Striga* resistance genes into available varieties and breeding materials as well as to continue research into the cultural methods of *Striga* control.

iii) *Development of early, drought tolerant varieties*

Incessant droughts have been a persistent feature of the region for more than a decade and largely accounts for the annual fluctuations of maize production in the semi-arid zone. Tolerance to soil moisture stress is therefore an important trait for increased production and productivity in the semi-arid zone.

At present, a number of early maturing varieties with moderate levels of drought tolerance have been developed and made available to several NARS. The drought tolerance in the released varieties would be enhanced so as to make them more attractive to farmers. There is also a need to incorporate drought tolerance into drought susceptible varieties already in production in several network member countries. Furthermore, a program has been initiated to develop an early maturing, drought tolerant population from landraces that evolved in some West African countries and some improved varieties that have shown good performance under drought stress. The drought tolerant population would serve as the source for future drought tolerant varieties. The research effort on drought would be sustained in order to make available varieties with good levels of drought tolerance for network member countries.

iv) Incorporation of resistance to the maize streak virus into maize varieties in West and Central Africa

Screenhouses for breeding for resistance to streak have been established in Ghana and Togo. The two countries would start converting varieties for streak resistance for other NARS to ensure that released streak susceptible maize varieties in network member countries are replaced by their resistant versions.

v) Promotion of on-farm level seed production

A major constraint to the adoption of improved maize varieties in West and Central Africa is the lack of availability of good quality seed. Therefore, making improved seed available to farmers is one of the potential means of ensuring high and stable maize yield. Significant contribution could be made

by the network through promotion, diffusion and utilization of suitable seed production technologies through short-term training workshops and assisting countries in the organization and development of their own seed processing units.

vi) Scientific leadership development

The development of scientific leadership would be continued through training programs for national scientists and technicians, biennial workshops, monitoring tours, seminars, consultation visits and publications.

vii) Strengthening of researcher-extensionist-farmer linkages

The issue of transfer of technology to farmers was identified by the SAFGRAD impact assessment team as a major weakness within the national agricultural research systems. The network would therefore devise and implement a strategy which would ensure the strengthening of the NARS-Extension-Farmers linkage. To this end the following activities are planned: maize workshops, annual research planning and publication of hand books on maize for farmers and extensionists. Also, on-farm testing and demonstrations in member countries would be emphasized in order to promote the adoption of network-generated technologies.

2.2 Technical Opportunities

Considerable research effort has been expended by IITA to develop *Striga* infestation techniques so as to minimize spatial variability and ensure accurate discrimination of tolerant/resistant and susceptible varieties. Selection for *Striga* tolerance/resistance is presently effective, and adapted

hybrid and open-pollinated varieties of maize with moderate levels of *Striga* resistance (STR) have been developed. The moderate level of *Striga* resistance in maize has to be supplemented by other *Striga* - reducing methods. To this end, IITA scientists are developing effective, locally adapted *Striga* - suppressive systems through the IITA trap-crop project which is a collaborative effort between IITA and selected NARS in Africa.

2.3 Institutional Opportunities

The SAFGRAD maize network has been an effective means for establishing and strengthening links among national programs in the sub-region and also between national and international agricultural research scientists. This has been achieved through monitoring tours organized for NARS scientists to visit IITA and to visit other network programs. Also through training organized by the network for scientists and technicians of member countries, seminars biennial workshops and consultation visits, the NARS countries have been prepared for the changes taking place in the agricultural scene of the sub-region. The national programs have benefited from their participation in the network research activities. For example, research by lead NARS has "spilled-over" into other national programs: through the regional trials conducted by the network, a Ghanaian variety, Golden Crystal was identified by the national program of Mali and it is currently covering large hectares in the country; the varieties CMS 8501, CMS 8710 developed by the national program of Cameroon has also been released by Central African Republic and adopted by the farmers of the country. The network has assisted the national programs of Ghana and Togo to develop streak screening facilities thus improving the capacity of the national programs to develop streak resistant varieties. Agricultural

research and extension services in several countries have been restructured or are being restructured to facilitate the flow of appropriate technologies to farmers.

The maize network among others, has played an important role in making the IARCS more responsive to the needs of the national programs in the sub-region. For example, when there was a severe outbreak of the maize streak virus in the semi-arid Africa in the early 80's, the Maize network responded by funding a special research project for transfer of the streak screening technology to the NARS. Shortly afterwards, IITA intensified its efforts to transfer streak screening technology to NARS by providing screenhouses to Ghana and Cameroon.

3. Project Objectives and Strategy

Goal

The overall goal of the project is to increase maize production and productivity of farmers in the savanna zone of West and Central Africa which would lead to increased food security and farmers' incomes.

Purpose

The purpose of the project is to continue strengthening the capacity and capability of the NARS within the network member countries to generate appropriate technologies for use by their farmers.

Objectives of the Project

The Project's overall objective is to increase farmers productivity, production and income through the use of appropriate technologies identified or developed by network and extended to farmers by extension services or

other parastatal extension agencies like the NGOs in the respective member countries. To this end, the project seeks specifically to:

- build on the substantial progress and achievements made by the maize network in SAFGRAD phase II with the assistance of IITA;
- take into account constraints identified by the SAFGRAD II end of project evaluation as well as those identified by the SAFGRAD impact assessment study and other competent persons;
- ensure collaborative approach to the setting of research priorities and training needs of the sub-region;
- develop the capacity within the network to carry out strong and well balanced collaborative research program with minimum outside support
- emphasize the growing need for greater utilization of network-generated technologies by farmers through effective linkages between NARS scientists and their agricultural extension personnel; and
- strengthen the collaboration between NARS and IITA in the implementation of the network activities.

Project Strategy

The project strategy is to bring together NARS, international scientists and government authorities of the member countries concerned to establish a strong link for agricultural development. This is to enable them to exchange experience and seek ways to increase agricultural production of the peasant farmers of the sub-Saharan Africa.

4. Plan of Work

4.1 Technical

To achieve the project objectives, the following networking program components are proposed:

- Collaborative research projects;
- Regionally-oriented resident research;
- Regional trials;
- Regional workshops and monitoring tours;
- Impact assessment;
- Human resources development.

4.1.1 Collaborative research projects

The collaborative research projects will seek to build and consolidate the gains and achievements made by the maize network under the SAFGRAD II (Appendix 5). Also, some of these activities will promote the adoption of technologies currently in the pipeline. The following collaborative research projects are therefore proposed for the approval of the NARS Directors:

- Breeding for disease resistant intermediate maturing maize varieties (110 days to maturity)
- Breeding for drought tolerant and disease resistant early maturing maize varieties (90-95 days to maturity).
- Breeding for disease resistant extra-early maturing maize varieties (80-85 days to maturity).
- *Striga* control
- Agronomic research for intermediate, early and extra-early maize varieties

- Promotion of technology transfer
- Promotion of on-farm level seed production.

Project I

Breeding for disease resistant, intermediate maturing maize varieties.

Proposed lead countries: Ghana, Togo and Cameroon.

A. Objectives

- i) To develop high yielding and disease resistant maize varieties that mature in 110 days for farmers in the northern guinea savanna zone.
- ii) To make the varieties available to collaborating national programs through regional trials.

B. Background

The northern guinea savanna zone is a high yield potential maize belt owing to optimum rainfall and adequate sunshine. It is essential that varieties appropriate to this optimal socio-climatic zone be developed. The incorporation of resistance to prevalent disease such as maize streak virus, fungal leaf diseases like blight, rust and *Curvularia* leaf spot and to *Striga* is a prerequisite to ensuring stable and high yields. Various types of germplasm will be obtained from IITA and CIMMYT in addition to those already in the programs of the lead NARS. The lead countries implementing this project have, with the assistance of IITA, installed streak screening facilities for continuous monitoring and upgrading of the resistance levels of breeding populations and varieties.

C. Methodology

- i) Acquire local and exotic germplasm types identified for good adaptation and high yield potential including those with high level of resistance to prevalent diseases.
- ii) Develop appropriate breeding populations. Use recurrent selection methods to improve breeding populations and extract experimental varieties.
- iii) Incorporate resistance to streak virus and other important diseases into breeding populations. Also convert existing streak susceptible varieties of national programs to resistant forms.
- iv) Carry out preliminary yield trials to identify elite varieties that will be proposed for regional trials by collaborating NARS.

D. Expected output

- i) High yielding disease-resistant varieties that fit the guinea savanna rainfall pattern.

E. Indicators for monitoring impact.

- i) Number of breeding populations developed
- ii) Demonstrated higher grain yields of improved varieties compared to farmers' varieties
- iii) Number of improved varieties from the lead centers entering into the regional trials
- iv) Increased production and productivity.

Project 2

Breeding drought tolerant and disease resistant early maturing maize varieties (90-95 days to maturity).

Proposed lead countries: Cameroon, Burkina Faso, Côte d'Ivoire.

A. Objectives

- i) To develop maize varieties that combine earliness with drought tolerance and resistance to prevalent major diseases
- ii) To evaluate these varieties in regional trials for the selection of stable and adapted entries by collaborating national programs.

B. Background

The cultivation of maize varieties that mature in about 90 days is a very attractive option for farmers in the Sudan Savanna and also in the Northern Guinea Savanna under conditions where late onset or early cessation of rains has reduced the effective rainfall period. In these ecologies, incidence of drought is often a major constraint. It is therefore desirable to incorporate drought tolerance into these varieties as well as resistance to the prevalent major diseases. Over the past 5 years, several national programs have been encouraged by the performance of early maize and its potential for filling the hunger gap. There is tremendous opportunity for improving the overall performance and suitability of these varieties.

C. Methodology

- i) Develop early maturing maize populations from local materials and exotic accessions.

- ii) Use appropriate breeding systems to generate and evaluate families including assessment for disease resistance and drought tolerance
- iii) Carry out preliminary yield trials of experimental varieties and subsequently test them in regional trials.

D. **Expected Output**

- i) Improved early maturing varieties of different grain types made available by lead NARS for regional on-station and on-farm adaptive trials
- ii) Early maturing populations with high yield and disease resistance developed
- iii) Improved early varieties released and adopted by farmers

E. **Indicators for Monitoring impact**

- i) Number of early maturing varieties
- ii) Number of early maturing populations developed
- iii) Improved yield performance under drought conditions
- iv) Increase in number of varieties in regional trials
- v) Experimental varieties available in regional on-station and adaptive trials
- vi) Increased production and productivity.

Project 3

Breeding for disease resistant extra-early maturing varieties

Proposed lead countries: Burkina Faso, Côte d'Ivoire, Cameroon

A. Objectives

To develop extra-early varieties with resistance to streak and other prevalent foliar diseases in West and Central Africa to fill the hunger gap in July.

B. Background

Through the resident research of the network coordinator in Burkina Faso, several extra-early maturing maize varieties have been developed from crosses between local and improved germplasm. Emphasis was placed on the selection for streak resistance, improved plant type and higher grain yield, while retaining the earliness trait. Susceptibility to foliar fungal diseases such as *Helminthosporium* leaf blight and *Curvularia* leaf spot has also been reduced. As a result of this effort, several extra-early varieties have been made available to national programs for filling the hunger gap in July. In addition, several extra-early germplasm with desirable attributes are available for use in the breeding programs of NARS.

C. Methodology

- i) Create synthetics or breeding populations from the available extra-early germplasm
- ii) Use recurrent selection methods to improve breeding populations and extract experimental varieties.
- iii) Improve synthetics for desirable attributes
- iv) Conduct preliminary yield trials and identify promising varieties for the regional on-station and on-farm adaptive trials.

D Expected output

- i) Extra-early maturing breeding populations with high yield and resistance to major diseases.
- ii) Improved extra-early maturing varieties made available by lead NARS for regional on-station and on-farm adaptive trials
- iii) Improved extra-early varieties released and adopted by farmers

E. Indicators for monitoring impact

- i) Number of extra-early maturing breeding populations developed by lead NARS
- ii) Number of improved extra-early varieties developed and made available for regional trials
- iii) Number of improved extra-early varieties adopted by farmers
- iv) Increase in production and productivity of farmers as a result of the adoption of the improved extra-early varieties.

Project 4

Striga control

Proposed lead NARS: Ghana, Cameroon and Togo.

A. Objectives

- i) To incorporate resistance/tolerance to *Striga hermonthica* into adapted maize varieties with high yield potential, desirable agronomic traits and grain quality
- ii) To develop and/or promote integrated *Striga* management technologies that are effective and appropriate to the resource poor maize farmers.

B. Background

One of the major biotic constraints to increased maize production in the semi arid zone of West and Central Africa is the parasitic weed, *Striga hermonthica*. *Striga* causes not only high yield losses, ranging up to total crop loss but also it can compel farmers to abandon maize cultivation entirely. *Striga* sick plots have been established in Ghana, Cameroon and Benin for screening for *Striga* resistance with the technical assistance of IITA. A number of promising *Striga* tolerant materials have been identified and are being used in the breeding programs. Also, evaluation of cultural practices for control of the incidence of *Striga* is in progress in Ghana and Cameroon, while Burkina Faso and Togo are working on biological control of *Striga*. The network would work closely with the *Striga* research group of IITA and participate actively in the IITA *Striga* trap crop project comprising IITA and the following NARS: Côte d'Ivoire, Kenya, Nigeria, Senegal, Tanzania and Zimbabwe.

C. Methodology

- i) Incorporation of *Striga* resistance genes into available varieties and breeding materials by lead centres.
- ii) Assessment of the potential of biological control strategies against *Striga*. These may include the use of biological control agents such as fungi, nematodes, smicronyx weevil in *Striga* parasitism.
- iii) Identification and improvement of appropriate cultural practices which will contribute to reduction of losses due to *Striga*. The cultural practices may include traditional weed control practices such as the heaping of soil up onto the ridge during weeding.

- iv) Evaluation of cheap herbicides such as Dicamba for effective pre-emergence *Striga* control.
- v) Identification of trap crops that cause suicidal germination of *Striga* and are economically feasible for the savanna zone.
- vi) Evaluation of different crop rotations and crop mixtures

D. Expected output

- i) Availability of maize varieties with significant levels of tolerance/resistance to *Striga* and high yield.
- ii) Availability of integrated *Striga* control packages that are economically feasible for farmers in different socio-economic settings.
- iii) Increased capability of NARS to efficiently screen trap crops/cultivars, to integrate them into the farming system and to make recommendations specific to locally prevailing conditions.

E. Indicators for monitoring impact

- i) Number of *Striga* resistant/tolerant varieties released and adopted by farmers.
- ii) The number of integrated *Striga* control packages available
- iii) Increase in maize productivity and production due to the effective control of *Striga*.

Project 5

Agronomic research for intermediate, early and extra-early maturing varieties

Lead countries: All collaborating NARS

A. Objectives

- i) To refine the existing management practices for the intermediate, early and extra-early maturing maize varieties
- ii) To develop new cultural practices for early, extra-early and intermediate varieties which are appropriate to existing farming systems and available resources.
- iii) To establish maize-legume intercropping, relay cropping and rotation systems involving early and extra-early varieties which would ensure the best utilization of the available rainfall, reduce the risk of total crop loss by drought and improve or conserve soil productivity.

B. Background

Grower recommendations such as fertilizer rates, population densities, time of fertilizer application, seed treatment and row planting have been developed for the intermediate, early and extra-early varieties and are now available to NARS. There is a need to refine the management practices and to develop more productive cultural practices. Research has demonstrated the importance of legumes in soil fertility maintenance, weed suppression and crop yield sustainability. There is a need to break the continuous maize cropping cycle through the use of suitable legumes and maize varieties for intercropping, relay cropping and rotation.

C. Methodology

- i) Evaluate different sources of fertilizer for maize production
- ii) Address crop establishment problems using early and extra-early varieties

- iii) Evaluate the potential of available legumes and maize varieties of the three maturity groups for intercropping, relay cropping and rotation in order to obtain a productive and sustainable natural resource base.

D. Expected output

- i) Development of economically feasible and appropriate management practices for the intermediate, early and extra-early varieties would have been underway
- ii) Availability of appropriate maize-legume intercropping, relay cropping and rotation systems to farmers
- iii) Recommendations on the use of different sources of fertilizer would have been extended to farmers
- iv) Availability of recommendations for solving the crop establishment problems using early and extra-early varieties.

E. Indicators for monitoring impact

- i) Appropriate maize-legume intercropping, relay cropping and rotation systems for intermediate, early and extra-early varieties made available for testing in regional adaptive trials.
- ii) Improved management practices for the intermediate, early and extra-early varieties for adaptive trials
- iii) Adoption of the recommendations for improving crop establishment
- iv) Increase in production, productivity and incomes of farmers as a result of the adoption of the recommended practices.

Project 6

Promotion of technology transfer

Proposed lead countries: All collaborating NARS

A. Objectives

- i) Promote technologies currently in the pipeline
- ii) To encourage and assist network member countries to establish and maintain strong research-extension-farmer linkages in their respective countries.

B. Background

The SAFGRAD impact assessment team identified technology transfer as a major weakness within the NARS. It was therefore recommended that future agricultural research endeavours should allocate more resources and efforts towards strengthening researcher-extensionist-farmer linkages in order to foster adoption of improved technologies. An important role of IITA will be to capitalize on the achievements of SAFGRAD phase II and promote the activities which will enhance interaction among scientists and extension workers, farmers, policy makers and other partners of agricultural development.

In SAFGRAD II, a number of technologies were developed or identified through Network's lead centres, network coordinator's resident research, IITA and other International Research Centres. While some of these technologies have already been released by several national programs, others are currently at various testing stages. The technologies in the pipeline at the national level are listed in Annex 2, while those in the pipeline at the

network level are listed in Annex 3. The network would endeavour to make these technologies available to member-countries for national adaptive trials.

C. Methodology

• *Strengthening researcher-extensionist-farmer linkages*

The network would encourage and assist member countries to organize the following activities in an effort to strengthen researcher-extensionist-farmer linkages within the respective countries:

- i) Annual Maize workshops within member countries: these would involve researchers, extensionists, policy makers and farmers. The objective would be to review research findings, grower recommendations and agricultural policies.
- ii) Annual research planning within member countries: this would involve researchers, extensionists, farmers and non-governmental organizations. The objective would be to establish research-extension-farmer linkages so that the three bodies can influence the research agenda of the respective network member countries.
- iii) Publication of hand books on maize for farmers and extensionists: Each member country of the Network would be encouraged and assisted both technically and financially to produce handbooks on maize for extensionists and farmers.

• *Promotion of technologies in the pipeline*

- i) Organize regional workshop to present the new technologies to member countries. This will enable the steering committee to design regional trials for evaluation by member countries.

- ii) Conduct on-farm testing and demonstrations using promising technologies presently in the pipeline in member countries.
- iii) Make agronomic practices in the pipeline available to NARS through training activities: seminars and group training sessions as well as monitoring tours.

D. Expected output.

- i) Release and adoption of improved varieties and agronomic practices by member countries
- ii) National program scientists trained in maize technologies
- iii) Regional adaptive trials designed and conducted by member countries
- iv) Increased maize production and productivity and incomes of farmers
- v) Production guides on maize prepared and made available to extensionists and farmers of each member country
- vi) Annual maize workshops and planning sessions organized in all member countries
- vii) Researcher-extensionist-farmer linkages strengthened in member countries

E. Indicators for monitoring impact

- i) Number of improved varieties and agronomic practices adopted by farmers
- ii) Percentage improvement in maize productivity due to the use of improved varieties and agronomic practices adopted by farmers
- iii) Scientific papers presented during annual maize workshops, the number of farmers and extensionists participating in workshops and planning sessions.

Project 7

Promotion of on-farm level seed production

Proposed lead countries: All collaborating NARS

A. Objectives

- i) Promote the diffusion and utilization of suitable seed production technologies
- ii) Provide assistance to NARS in the development of on-farm community level seed production schemes
- iii) Facilitate the increase of breeder seed production in adequate quantities at research stations

B. Background

Several maize varieties have been released in network member countries through the network's efforts. However, the adoption of the improved varieties is not as high as desirable partly due to lack of well-organized seed industry in some member countries. The problem of lack of seed availability is most serious with the extra-early and early maturing varieties because the seed production is not as profitable as that of the intermediate and late varieties due to the lower grain yield per hectare of the early and extra-early varieties. Therefore making available to farmers seed of the improved varieties, particularly the extra-early and early is one of the potential means of ensuring high adoption of the released maize varieties and high and stable yield.

C. **Methodology**

- i) Organize short-term training, workshops for seed producers
- ii) Provide technical assistance to member countries in the organization and development of their own seed processing units
- iii) Encourage NARS scientists to work with selected farmers and non-governmental organizations in the development of on-farm community level seed production schemes
- iv) Assist NARS scientists to produce breeder seed of released varieties in adequate quantities at research stations.

D. **Expected output**

- i) Breeder seed of released varieties available in adequate quantities in member countries
- ii) Seed of improved extra-early and early varieties made available through community level seed production schemes
- iii) Well-trained seed producers producing seeds of early and extra-early varieties at the on-farm community level

E. **Indicators for monitoring impact**

- i) Quantity of breeder seed of released varieties produced by member countries
- ii) Quantity of certified seed of the extra-early and early varieties produced by member countries
- iii) number of seed producers trained
- iv) number of community level seed production schemes organized by member countries.

Research workplans for the seven collaborative projects proposed, will be submitted by lead NARS annually for review and approval by the SC. A supplementary financial support will be provided yearly by the network to facilitate the execution of collaborative research projects. It is also proposed that the network should provide not only technical support in the design and conduct of on-farm adaptive trials and demonstrations in member countries but also some financial support for these activities.

4.1.2 Regionally-oriented resident research

The coordinator of the maize network will spend 20 - 25% of his time on research areas of his competence and which is an integral part of the network's program. He would work in collaboration with the national programs of the host country. The coordinator's resident research would help to maintain his professional skills and enhance his professional image vis-à-vis NARS scientists and other collaborators. The resident research would be carried out at selected experimental sites in the guinea savanna zone in the host country. The following research activities are proposed:

- participation in the varietal development program of the host country
- participation in the national variety trials including on-farm testing and demonstrations in the host country
- seed multiplication of maize varieties nominated for regional trials
- establishment of nurseries for training purposes
- germplasm conservation and maintenance

The regionally-oriented resident research envisaged would be discussed and reviewed with the appropriate NARS in a workshop to be held within three months of the commencement of the project. Based on the

outcome of the workshop, a workplan and budget for the resident research component of the project would be prepared.

4.1.3 Regional trials

Data on promising new technologies developed or identified by the network lead centres, other NARS, and IITA or any other international centre will be presented for discussion during the workshops to be organized by the network. Technologies of interest to the network would be included in the regional trials designed by the network SC for evaluation by member-countries. Regional trials would thus continue to be an important vehicle for technology exchange within the network.

The regional trials will be dispatched yearly to NARS upon request. The following trials are proposed for 1994 and 1995.

- Regional Uniform Early Variety Trials (RUVT-EARLY): with the objective of identifying early cultivars, i.e. 90 - 95 days to maturity
- Regional Uniform Extra-Early Variety Trials (RUVT-EXTRA-EARLY): with the objective of identifying extra-early cultivars i.e. less than 82 days to maturity
- Regional Adaptive Trials: with the objective of promoting the adoption of the network improved early and extra-early maize varieties and the accompanying agronomic practices.

4.1.4 Regional workshops and monitoring tours

Workshops serve as the fora for exchange of scientific information and new technology. Workshops are proposed for 1994 and 1995. These will allow presentation and review of the results from the previous year's regional trials and other relevant research conducted by lead and associate centres,

other NARS, IITA and other international centres. The regional trials will be made available on request to participating NARS. Other relevant activities for the success of the network such as the election of the new SC will be carried out during the workshop.

A monitoring tour is proposed for the network in 1994. Scientists from selected network member-countries will visit several other national programs, including IITA, if possible. They will have the opportunity to observe and discuss in detail with scientists in the host countries, issues such as production constraints and new technologies developed to overcome the constraints, research methodologies used in developing the technologies and problems faced by scientists in carrying out their research activities. The monitoring tours would not only provide a means for strong interaction among national scientists, but also would re-enforce the goals of networking.

4.1.5 Impact Assessment

The objective is to constantly monitor the adaptation and release of technologies developed by the project, the area under cultivation and the production levels in member countries during the next 2 years so as to determine the impact of the research effort of the network. Such information would be obtained during monitoring tours, through questionnaires to collaborators supplemented by reports from National Bureau of Statistics.

4.1.6 Human Resource Development

Training will be an important activity of the maize network. The network will organize annual in-service training and workshops. These will focus on particular production problems or research methodologies identified by the Steering Committee. Participants at the different training sessions

will include research scientists and technicians from the network member-countries. Some potential topics include: breeding for *Striga* tolerance resistance, methodologies for on-farm demonstrations, technology adoption and agricultural policy changes; seed production, varietal maintenance, data collection, processing and interpretation.

4.2 *Institutional - Role of NARS in leadership management*

It has been the goal of IITA to transfer the leadership management of network activities as soon as practicable. Working on the assumption that the NARS now have the capability and willingness to assume this responsibility, the structure and management of the network will possibly comprise of the following entities:

4.2.1 *Collaborating countries of the Maize Network*

Based on the importance of maize in the individual countries in West Central and Africa (Table I) and the potential impact of maize production in these countries, the following are proposed as the collaborating countries of the network: Ghana, Nigeria, Togo, Benin, Côte d'Ivoire, Mali, Burkina Faso and Cameroon,

4.2.2 *Committee of NARS Directors*

This committee will consist of the directors of collaborating NARS, a representative of IITA and a donor representative. The committee will meet annually as an oversight authority of the network with the following functions:

- determine policy and provide guidance in network management

- review workplan and budget in conformity with network objectives
- encourage technical, administrative and financial support of the network at the national level
- facilitate the realization of maize research and related activities
- review annual technical progress report of the network and propose necessary modifications or termination of activities.

Each director of research would serve as the direct link between the maize network and the agricultural authorities of NARS which are actively engaged in network activities. The chairman of the committee of NARS directors would be elected by his peers for a period of two years.

4.2.3 The Steering Committee

This is an executive management committee. It shall consist of scientists of participating member countries and elected in such a manner as to provide for representation of the important scientific disciplines. Representatives of cognate or appropriate IITA programs shall attend its meetings as observers. The steering committee shall perform the following functions:

- review all workplans and budget and allocate resources to different collaborative projects
- prepare the agenda for biennial workshops and monitoring tours
- monitor the implementation of network activities.

The steering committee shall meet at least twice a year and may co-opt persons with expertise to assist in carrying out its functions.

4.2.4 Coordination - (Pole or Lead centre)

The siting of the coordination entity must be predicated on the capacity of a centre to effectively provide for the needs of the network including technical backstopping, managerial facilities. In this connection, three national research systems appear to satisfy these requirements:

- a) IDESSA, Bouaké (Côte d'Ivoire) - A major advantage is that IITA has its savanna station for maize research sited there and the network coordinator will be provided both technical and administrative support. It is also the headquarters of IDESSA, the national research institute given the mandate for maize research. Furthermore, it is the headquarters of WARDA.
- b) CRI, Kumasi (Ghana) - The national system offers the strongest maize research team in the sub-region having had CIMMYT and IITA support for the past 15 years. IITA Liaison Office located within the Crop Research Institute will provide administrative support and facilitate closer technical backstopping from IITA maize program. CIDA's continued support of the Ghana Grains Development Project including maize, is guaranteed for the next 4 years.
- c) INERA, Ouagadougou (Burkina Faso) - This is the present coordination centre for the maize network. Through the SAFGRAD project, the maize research infrastructure is well developed. The network could therefore take advantage of the existing research facilities particularly capital equipment at Kamboinse and Farako-Bâ.

4.2.5 Network Coordinator

IITA will continue to play a catalytic role and provide backstopping through the network coordinator, during the transitional period.

Job description: The network coordinator will be responsible for:

- the management of the network secretariat;
- liaison with host country research system on matters related to the network
- preparing, in consultation with the SC, the network annual workplan and budget
- making necessary arrangements for the network meetings: steering committee, workshops, monitoring tours, etc.
- implementing decisions on networking matters taken by the committee of NARS directors and the steering committee including collaborative research activities, training and regional trials;
- providing guidance on planning, analyzing and reporting on network activities; and
- serving as a link between IARCs and network member countries and for arranging backstopping when necessary
- preparing semi-annual and annual reports for the donors

Qualification:

Ph.D. or M.Sc degree in agricultural biological sciences and at least five (5) years of experience in agricultural research and related activities. Additionally, candidates must have proven capabilities of being able to work with other nationals. The candidate must possess French language FSI proficiency rating of S-3; R-3. The biographical data sheet of the candidate identified is attached (Annex 6).

4.2.6 Executing Agency

IITA, with its long experience in network coordination of various crops across the continent, will continue to provide not only technical and managerial support but also provide a network coordinator during the transition period. During this period, IITA will make deliberate effort to transfer scientific and management capabilities of the network to the selected NARS. IITA will however continue to provide scientific, training and information resource base for the network as an active partner. IITA will assume the following responsibilities:

- administrative and technical guidance
- accounting and disbursement of funds in accordance with donor accounting procedures
- participation in technical reviews and provision of support for research plans
- technical review and editing of research findings for publications
- assistance in identification and introduction of potentially useful germplasm of maize
- procurement and shipment of commodities
- development and logistic support of short-term in-service training
- supplying consultants from its own scientific and administrative staff or from other sources.

4.3 Technology Transfer

The objective of this component is to establish and maintain within the respective countries, links with institutions that conduct agronomic and socio-economic research.

The success of any agricultural research enterprise depends on effective linkage with agricultural extension and development institutions as well as with international agricultural research institutions. Some NARS are well linked with national and international research systems and enjoy good relationships with national extension and relevant development agencies. Others appear not so well linked. The project would seek to forge linkages with national extension and development agencies and with other projects such as the EEC on-farm adaptive research project and the collaborative group on maize based research systems (COMBS) of IITA.

The strategy to ensure the strengthening of the research-extension-farmer linkage within member countries would be devised in a workshop involving the appropriate NARS and IITA within three months of the initiation of the project. Based on the outcome of the workshop, the workplan and the budget for the technology transfer component of the project would be prepared.

5. Budget

5.1 *National Programs*

- i) Participating member countries of the network will allocate land, office space, research personnel and other resources to establish and maintain networking activities. National maize researchers, particularly those of the lead centres, will be assigned responsibilities for which they have expertise and comparative advantage to address network constraints and other problems. Each participating member country will be expected to make provision in its annual budget as a direct contribution to the network effort.

- ii) To the extent possible, effort will be made to seek bilateral funding support from the local USAID mission in the respective countries and from other donors.

5.2 Network Program

5.2.1 International Agricultural Research Centre - IITA

The International Institute of Tropical Agriculture will provide the following inputs:

- technical backstopping of the network activities and also administrative, managerial and logistic support
- provision and distribution of potential germplasm
- short-term consultants including IITA scientists and research managers
- training, attachment courses and participation in IITA annual workplans
- participation in annual workplans

5.2.2 Other Donors

Efforts will be made to seek additional support especially for national programs support from other donors such as the African Development Bank, the International Fund for Agricultural Development and the Canadian International Development Agency under its new vision for regional integration in Africa.

5.2.3 The United States Agency for International Development (USAID)

The proposal seeks funding support totaling \$900,000 as shown in Table 2 from the United States Agency for International Development in order to

maintain the momentum of the gains and achievements of the maize network over a period of 2 years and to facilitate the transfer of network responsibilities to the NARS (please refer to annex 5 for budget notes).

Table 2: Budget estimates

A.	Network Coordination	285,360
B.	Operation	192,035
C.	Support to NARS	320,000
D.	Capital	50,000
E.	Overhead	52,605

		900,000

Detailed plan of work covering technical, managerial and financial participation of NARS leading to the gradual transfer of management responsibilities to NARS would be a subject of the first meeting/workshop of NARS directors and network scientists to be conveyed within the first three months of the project implementation.

5.2.4 Audit and Program Evaluation

Audit: Financial audit of the project will be held as required by the donors Audit.

Evaluation: A final evaluation will be conducted by donors and IITA representatives, in conjunction with participating country officials. This review will assess project accomplishments and determine the capability of the national programs to assume a larger role in the network. To the extent practicable, the evaluation will assess the impact of research and networking activities on maize production.

6. *Monitoring and Evaluation*

Monitoring and evaluation will provide the means for assessing results against the planned objectives, introducing interim adjustments and generating feedback for future planning. It is envisaged that the collaborating NARS's capacities in monitoring and evaluation will also be strengthened.

Essential information will be collated at the annual workshops to facilitate monitoring. These will be stipulated in the logframe.

The USAID Africa Bureau has already prepared a draft set of indicators which will assist in identifying key data set requirements. They could provide the basis for the evaluation of the project. These indicators will need to be adjusted in order to meet the project's specific needs with sufficient accuracy. They will address such issues as:

- changes in productivity and income
- adoption rate
- impact on resource base
- mid-term evaluation
- financial audits
- end of project review

These inputs will be programmed in the annual workplans including backstopping provided by IITA and the role of the collaborating NARS.

7. *Log Frame*

The logical framework matrix covering the duration of the network activities is provided in Annex 4.

8. Reports

- a) *Quarterly financial reports:* IITA shall submit to USAID, on a quarterly basis, financial reports which indicate by line item per budget level its expenditure and accruals. In addition, the report will indicate projected expenditures for the next six months. The format for this reporting shall be in accordance with USAID directives.
- b) *Network plan of action:* The Steering Committee shall prepare a detailed workplan within 3 months of the start of the project. The plan will encompass collaborative research, on-farm trials and demonstration programs to be implemented and plans for training and human resource development as well as plans for strengthening researcher-extensionist-farmer linkages in member countries.
- c) *Semi-annual progress report:* The network coordinator under the guidance of the Steering Committee will prepare six-month progress reports by 31 March and 30 September each year. These reports will be related to the workplans and will include summary narrative description of activities, main achievements, major problems encountered and recommendations for improvement and follow-up action.
- d) *Final report:* sixty days prior to the completion of this project, the coordinator will prepare a draft of the final report incorporating a review of project achievements, problems encountered and recommendations for future activities with regard to specifically stated objectives. After receipt of comments from USAID, a final report will be submitted 30 days after the end of the project.

Annex 1

Promising technologies in the pipeline at the network level in 1993

Attributes	Name of varieties
1. Extra-early varieties	(Across 8131 x JFS) x Local Raytiri, CSP, CSP-SR, CSP x Local Raytiri, Pool 27 x Gua 314, Pool 28 x Gua 314, Pool 30 x Gua 314, TZEE-WI, TZEE-W2, TZEE-Y, TZEE-Yellow Pool, TZEE-Y SR, TZEEF-Y, TZEESR-W x Gua 314
2. Early varieties	Across 90 Pool 16 DT, Farako-Bâ 90 Pool 16 DT, Ina 90 Pool 16 DT, Kamboinse 90 Pool 16 DT, Maroua 90 Pool 16 DT, Nyankpala 90 Pool 16 DT, Maka SR, Dorke SR, Syn. E1, Syn. E2.

Annex 2

Promising maize varieties in the pipeline for release by NARS in West and Central Africa in 1993.

Country/Name	Varieties
Benin	DMR-ESRW, Pool 16 DR, EV 8328-SR
Burkina Faso	FBC 6, KPB, KPJ, KEB, KEJ, Pool 16DR, TZEE-W SR, TZEE-YSR
Cameroon	TZEE-WSR, TZEE-YSR
Cape Verde	Maka
Central African Republic	CMS 8501, CMS 8710
Chad	Pool 16 DR, CMS 8602, TZE EW-SR, CSP x L. Raytiri F3
Côte d'Ivoire	Maka, Pool 16 DR, TZEF-Y, Ferke 8336
Ghana	Dorke SR, GH 8363-SR (QPM), TZEE-WSR
Guinea	Ikenne 83 TZSR-Y-I, EV 8428-SR, IRAT 200, IRAT 292, Poza Rica 8526
Mali	DMR-ESRY, TZEF-Y, Los Banos 8531, Across 8464
Mauritania	Gwebi 8422, Pool 16 DR, CSP Early
Niger	Composite Kollo 1
Nigeria	White Composite
Senegal	Sids 8445, Ikenne (1) 8149-SR
Togo	AB 1, AB 12, AB 13

Annex 3

Maize varieties made available to NARS through the Maize Network

**i) Late and intermediate maturing varieties
(110-120 days) for
Northern Guinea Savanna zone.**

<u>Variety</u>	<u>Origin</u>
Abelechi	Ghana
Aburotia	Ghana
AB 22	Togo
CSM 8710	Cameroon
Okomasa	Ghana
Dobidi	Ghana
EV 8422-SR	CIMMYT-IITA
EV 8428-SR	CIMMYT-IITA
EV 8435-SR	CIMMYT-IITA
EV 8443-SR	CIMMYT-IITA
EV 8444-SR	CIMMYT-IITA
EV 8449-SR	CIMMYT-IITA
FARAKO-BA 85 TZSR-W-1	IITA
FARAKO-BA 85 TZSR-Y-1	IITA
NDOCK 8701	Cameroon
LOUMBILA 84 TZUT-Y	IITA & Burkina Faso
TZB-SR	IITA
TZPB-SR	IITA
Golden Crystal	Ghana
Composite 4	Ghana
Zm10	Senegal
Synthetic C	Senegal
BDS	IRAT/Senegal
AB22	Togo
CJI	IRAT/Benin
Staha	Tanzania
IRAT 100	IRAT/Burkina Faso
IRAT 102	IRAT/ Burkina Faso
IRAT 178	IRAT/Côte d'Ivoire
NH2	IRAT/Benin
Elite x Early	
Mexican Composite	Ghana

**ii) Early maturing (90-100 days) and/or
drought tolerant varieties for Sudan savanna.**

<u>Variety</u>	<u>Origin</u>
Across 86 Pool 16DT	IITA-SAFGRAD
Across 87 Pool 16SR	IITA
Across 88 Pool 16DT	IITA-SAFGRAD
BDP-SR BC3 F3	Benin-SAFGRAD
DMR-ESRW	IITA
DMR-ESRY	IITA
DR Comp. Early	IITA-SAFGRAD
Early 86 Pool 16DT	IITA-SAFGRAD
EV 8730-SR	CIMMYT-IITA
EV 8731-SR	CIMMYT-IITA
Farako-Bâ 86 Pool 16DT	IITA-SAFGRAD
Farako-Bâ 88 Pool 16DR	IITA-SAFGRAD
FBC 6	Burkina Faso
Ikenne 88 BU-ESRW	IITA

Kamboinse 88 Pool 16DT
 Kawanzie
 Maka-SR
 SAFITA-2
 TZE Comp. 3 x 4
 TZESR-W
 TZESRW-SE
 Mexican 17 Early
 Jaune Dente de Bambey
 MTS

IITA-SAFGRAD
 Ghana
 Mauritania-SAFGRAD
 IITA-SAFGRAD
 IITA
 IITA
 IITA
 Ghana
 Senegal
 IRAT/Côte d'Ivoire

iii) Extra-early maturing varieties for Sudan savanna and to bridge hunger gap in other zones. No international centre worked on this maturity group.

<u>Variety</u>	<u>Origin</u>
(Across 8131 x JFS) x	
Local Raytiri	IITA-SAFGRAD
CSP	CIMMYT
CSP-SR	IITA-SAFGRAD
CSP x Local Raytiri	IITA-SAFGRAD
Pool 27 x Gua 314	IITA-SAFGRAD
Pool 28 x Gua 314	IITA-SAFGRAD
Pool 30 x Gua 314	IITA-SAFGRAD
TZEE-W1	IITA-SAFGRAD
TZEE-W2	IITA-SAFGRAD
TZEE-White Pool	IITA-SAFGRAD
TZEE-WSR	IITA-SAFGRAD
TZEE-Y	IITA-SAFGRAD
TZEE-Yellow Pool	IITA-SAFGRAD
TZEE-YSR	IITA-SAFGRAD
TZEF-Y	IITA-SAFGRAD
TZESR-W x Gua 314	IITA-SAFGRAD

iv) Improved agronomic practices

- a. Tied ridges for soil moisture conservation in Sudan Savanna.
- b. Better seed treatment chemicals for improved plant establishment and grain yield.
- c. Increased plant population for higher grain yield of early and extra-early varieties.
- d. Earlier date of fertilizer application (top dressing) for increased yield of early and extra-early varieties.

Annex 4: Logical Framework Matrix

Narrative summary	Objective verifiable justification	Means of verification	Important assumptions
<p>(1) <u>Program or sector goal</u></p> <p>To increase the productivity and production of maize among small farmers in network member countries.</p>	<ul style="list-style-type: none"> - Increased production area, - Increased adoption of improved technologies - Increased yield and production. 	<ul style="list-style-type: none"> - Government statistics - Case studies 	<ul style="list-style-type: none"> - Increased allocation of national resources to research and extension; - Changes in agricultural policies; - Availability of needed inputs and credit; - Incentive price policies.
<p>(2) <u>Program purpose</u></p> <p>To increase the efficiency and effectiveness of agricultural research on maize in the network member countries by strengthening the maize research network to plan, broaden the base of support and make productive use of resources.</p>	<p><u>Conditions to indicate achievement</u></p> <ul style="list-style-type: none"> - Effectively operating maize collaborative research network in West and Central Africa which operates by the following criteria: <ul style="list-style-type: none"> • Establish common goals; • Policy set by steering committee of active researchers; • Conduct, at least, annual meetings to identify objectives, technical problems, review past and plan future research and other relevant network activities. • Effective linkage between research, and extension including non-governmental organizations at the national level. 	<ul style="list-style-type: none"> - Annual reports; - Attendance at steering committee meetings; - Attendance at the network meetings; - Reports from country missions; - Information from networks, NARS's and OAU-NCO 	<ul style="list-style-type: none"> - All interested parties willing and able to participate; - NARS actively participating and eventually willing and able to assume leadership; - IITA willing to assume leadership role (during the transition period) and operate the network in a participatory manner; - Committee of NARS Directors willing to assume leadership role in sensitizing government authorities to better manage agricultural research and extension services and introduce policy changes compatible with an effective and efficient agricultural development. - Improved prioritization of research work by NARS though participation in the network

(3) Inputs

- Technical Assistance staff
- IITA technical support
- NARS support of regional research in-kind
- Project evaluation

Network coordinator

- Scientist and research managers to provide expertise towards network coordination and management
- Questionnaires to be administered during monitoring tours
- Information from national bureau of statistics

Steering Committee semi-annual and annual report workshop proceedings

- do -
- do -
- do -

Donor funding IITA backstopping

Narrative summary

Objective verifiable justification

Means of verification

Important assumptions

(4) Outputs

- An effectively functioning Network Coordinating centre
- An effectively functioning Steering Committee.
- Research for the network reviewed and evaluated annually;
- Future research activities identified, planned and allocated among participants.
- In-country research implemented by NARS's;
- Varieties released and cultural practices recommended;

Magnitude of outputs

- Annual meetings of committee of NARS Directors provides guidance for IARCs
- Annual meetings of scientists, monitoring tours and steering committee meetings.
- Network planned agronomic trials;
- Relevant varieties released based upon thorough testing
- Maize production guides made available to farmers and extensionists in member countries

- Reports by the network and IITA

- Reports by Network Coordinating Office

- Monitoring of network meetings.

- Visits to and data from NARS's

- Visits to and data from IITA networks.

- Able leadership in African regional coordination;

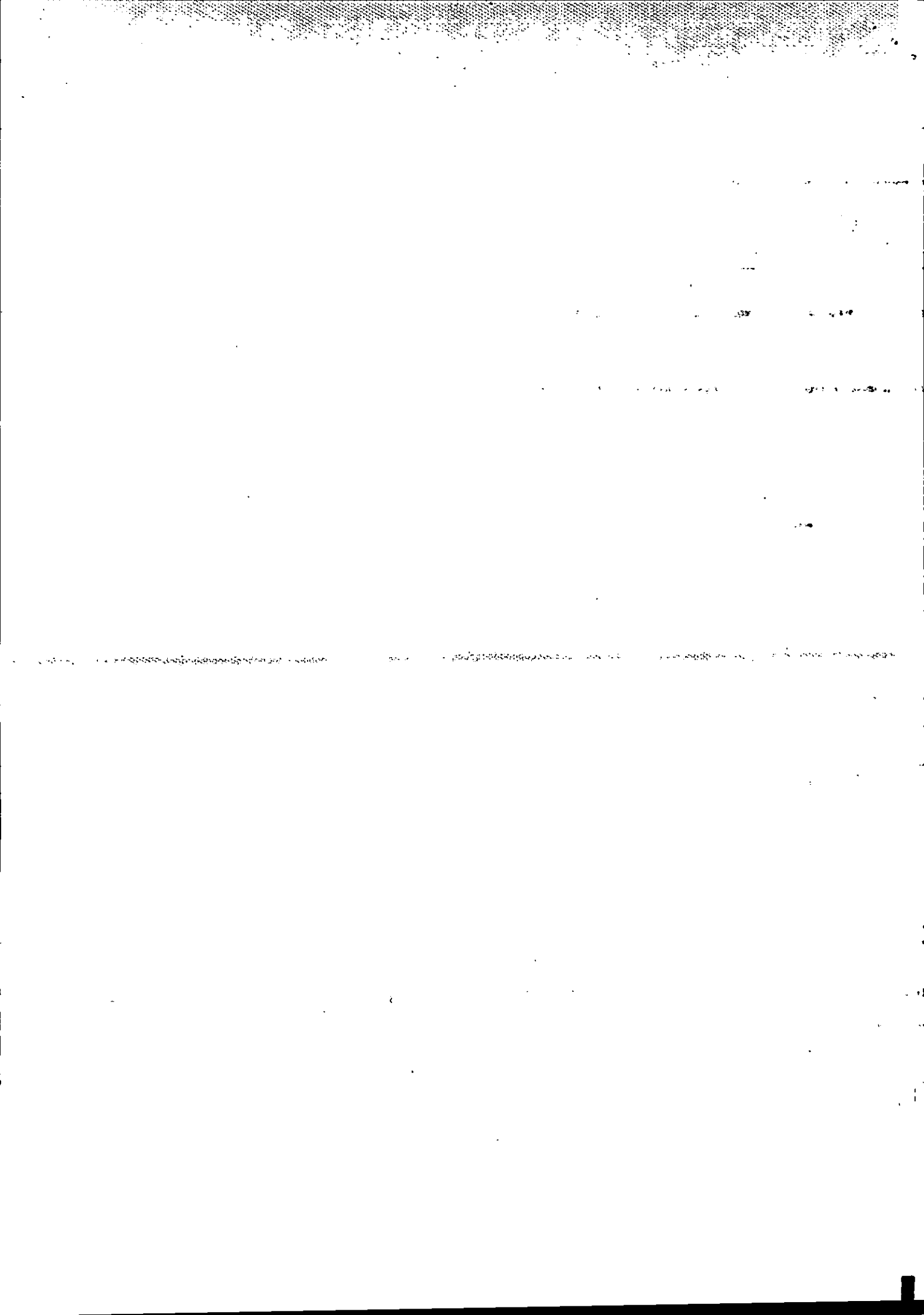
- NARS's willing to review, plan, and allocate research responsibilities.

- NARS will fund in country research costs.

- IITA and USAID directly-managed, centrally funded projects will interact responsibly with NARS.

- Technologies will be developed, through improved multi-disciplinary participation and on-farm testing and will be diffused to farmers.

- Responsive technical back-
topping by IITA;
 - Network Steering Committee
meets at least biannually;
 - Network priorities are reflected
in NARS decision making.
 - Opportunities for future donor
support at regional and national
levels clarified.
 - Viable linkage between re-
search & extension establish-
ments in member countries.
- Maize workshops organized
annually in member countries.
 - Planning sessions involving
researchers, extensionists and
farmers organized in member-
countries
- Visits to and reports from
NARS.
 - Visits to and reports from
NARS.
 - Visits to and reports from
NARS



Annex 5: Budget Notes

A. NETWORK COORDINATION

- Salary and Allowances for the Professional Staff

The figures budgeted for the coordinator are based on the actual expenses incurred during 1993. They include salary, cost of living allowance, retirement benefit, insurance, vehicle allowance, home leave expenses, children education allowances, annual medical examination costs, hardship allowance, night watch and gardener expenses. A 5% annual salary increase has been worked into the salary component.

- Support Staff

- Budgetary provision is made for a secretary, a driver and two field technical assistants.

B. OPERATIONAL EXPENSES

This include funds budgeted for vehicle insurance, operation and maintenance, laboratory supplies, office utility and supplies, research costs and casual labor.

- International travel

Normally, the coordinator would make two trips to IITA in a year costing \$2,000 each. The coordinator is expected to make at least 2 visits of 14 days each per year to the collaborating NARS. The

amount budgeted will cover the cost of air fares, hotel expenses and per diem.

- Local travel

The coordinator will carry out breeding experiments at various sites in the host country and is expected to make 2 field visits of 5 days duration per annum. The budget line item will cover cost of hotel bills and per diem for the trips.

- Regional Workshop and Monitoring Tour

A regional workshop and a monitoring tour are budgeted for the two years of project implementation.

- Steering Committee and Committee of Directors of Research Meeting

This budget line item will cover the cost of three Steering Committee meetings and a meeting of the research directors to be held within the region.

C. SUPPORT TO NARS

Funding support to NARS for collaborative research projects and technology transfer.

D. CAPITAL ITEMS

- Vehicle

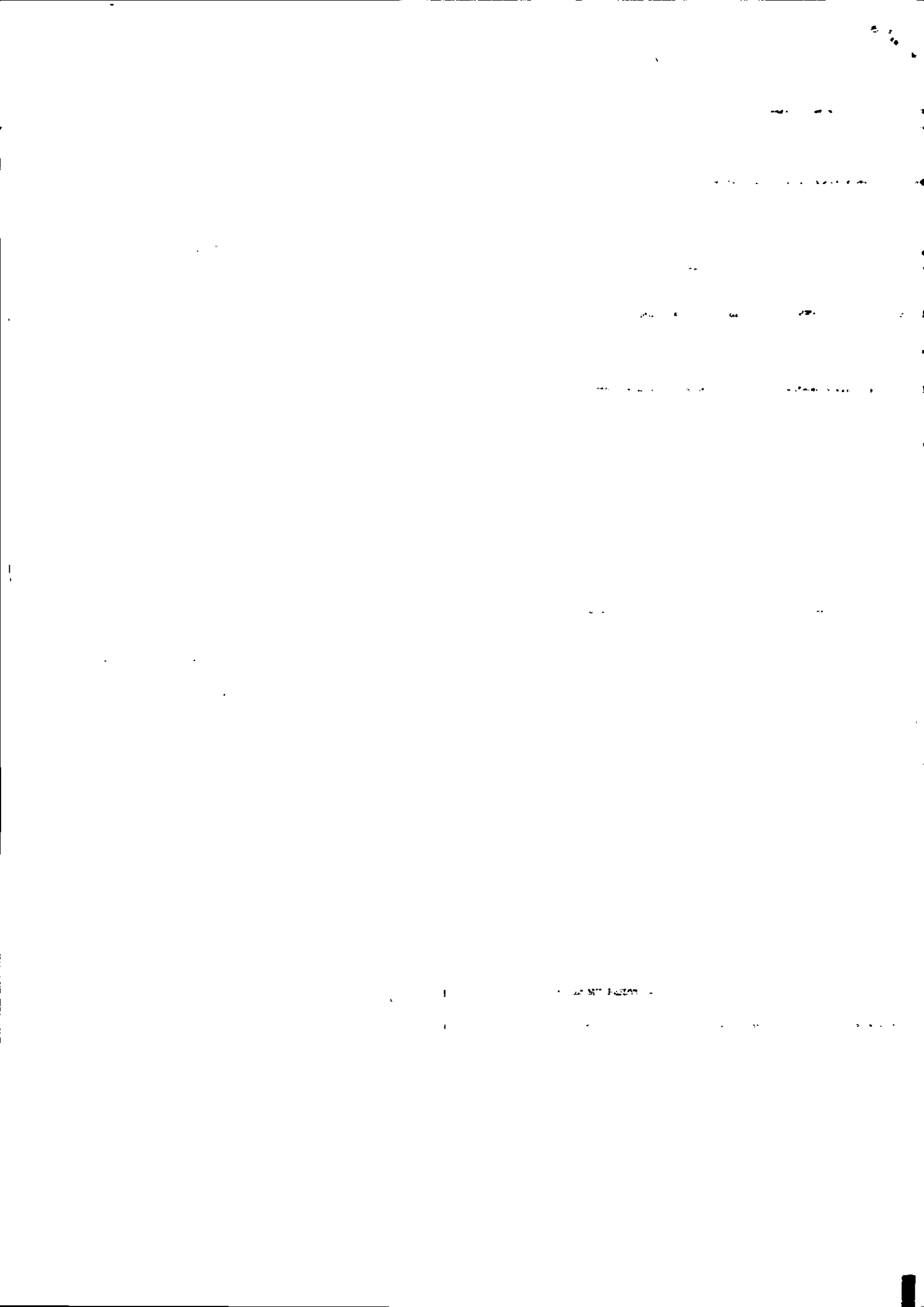
The project vehicle purchased in 1988 is old and needs to be replaced.

- Office and Household Equipment

Household appliances and furniture also require replacement especially if the coordinator is to be relocated.

E. OVERHEAD

Central services costs or overheads are calculated at the rate of 18.8%. A copy is attached.



CONTRACTOR EMPLOYEE BIOGRAPHICAL DATA SHEET

(SEE PRIVACY ACT STATEMENT ON REVERSE)

INSTRUCTIONS:
Submit in triplicate to
contracting officer.
See reverse for Contractor
Certification.

1. Name (Last, First, Middle) <input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Miss <input type="checkbox"/> Ms. Badu-Apraku, Baffour		2. Contractor's Name International Institute of Tropical Agriculture	
3. Address (include ZIP Code) I I T A BP 1495, OUAGADOUGOU		4. Contract No.	5. Position Under Contract Scientist
9. Telephone Number (include area code) 26-30-09191		6. Proposed Salary	7. Country of Assignment
10. Marital Status <input checked="" type="checkbox"/> Married <input type="checkbox"/> Single <input type="checkbox"/> Other (specify)		8. Duration of Assignment	
12. Date of Birth 5-8-49		11. Names and Ages of Dependents to Accompany Individual (if applicable) Aboagyewaa Badu-Apraku - 37yrs Baffour Kwa Badu Apraku 13 yrs Kwame Baa Apraku - 11 yrs Kofi Dabo-Apraku - 8 yrs Abenaa Boatema-Apraku - 7 yrs Kwaku Agyepong-Apraku - 5yrs	
13. Place of Birth Akumadan, Ghana			
14. Citizenship (if non-U.S. citizen, give visa status) Ghanaian			

15. EDUCATION (include all secondary, business college or university training)

NAME AND LOCATION OF INSTITUTION	MAJOR SUBJECTS	Credits Completed		Type of Degree	Date of Degree
		Semester Hours	Quarter Hours		
Kwapeman Secondary School, Ghana	Eng. French, Maths, Science			O'level	1968
Labohe Secondary School, Ghana	Physics, Chem. Biol.			A'level	1971
Univ. of Science and Technology, Ghana	Crop Sci. Econs. Seed Prod.			B.Sc.	1975
Univ. of Guelph, Canada	Breeding, Genetics, Agron.			M.Sc.	1981
Cornell University, Ithaca, NY, USA	Breeding, Genetics, Path.			Ph.D.	1986

16. EMPLOYMENT HISTORY

1. Give last three (3) years. Continue on reverse to list all employment related to duties of proposed assignment.
2. Salary definition - basic periodic payment for services rendered.

Exclude bonuses, profit-sharing arrangements, commissions, consultant fees, extra or overtime work payments, overseas differential, or quarters, cost of living or dependent education allowances.

POSITION TITLE	EMPLOYER'S NAME AND ADDRESS	Dates of Employment (Mo., Yr.)		Salary	
		From	To	Dollars	Per.
Collaborative visiting Scientist	IITA, PMB 5320, Ibadan, Nigeria	April, 1989	April, 1990	24,000	year
Joint Coordinator Ghana/CIDA Grains Proj.	Crops Research Institute Box 3785, Kumasi	May, 1990	May, 1992	6,000	year
Coordinator, Maize Network for West and Central Africa	IITA, PMB 5320, Ibadan, Nigeria	May, 1992	Sept. 1993	41,574	year

17. SPECIFIC CONSULTANT SERVICES (give last three (3) years)

SERVICE PERFORMED	EMPLOYER'S NAME AND ADDRESS	Dates of Employment (Mo., Day)		DAILY RATE
		From	To	

18. LANGUAGE PROFICIENCY

LANGUAGE	Speaking			Reading			Writing			Understanding		
	Fair	Good	Excl.	Fair	Good	Excl.	Fair	Good	Excl.	Fair	Good	Excl.
English			X			X			X			X
French	X			X			X			X		

19. Special Qualifications (honors, professional societies, special licenses, publications, research, special skills, and relevant education not previously mentioned; use reverse side of form, if necessary)

- 1) Winner of 1992 National Best Researcher Award in Ghana
- 2) SAFGRAD Merit Award
- 3) Member, Ghana Crop Science Society

20. CERTIFICATION: To the best of my knowledge, the above facts as stated are true and correct.

Signature of Employee

Date

CONTRACTOR'S CERTIFICATION *(To be completed by responsible representative of Contractor)*

A. I hereby certify that ('X' appropriate box):

- The initial salary proposed herein meets the salary standards prescribed in the contract.
- The salary increase proposed herein conforms to the customary policy and practice for this organization for periodic salary increases.

B. Justification or Remarks

Signature	Title	Date

PRIVACY ACT STATEMENT

The following statement is required by the Privacy Act of 1974 (Public Law 93-579; 88 Statute 1896).

The information requested on this form is needed by AID to evaluate your suitability for the position for which you have been nominated as a contract employee. It is necessary that you provide the information for AID to consider your nomination. The Foreign Assistance Act of 1961, as amended, constitutes authority for its collection.

Employers and educational institutions you list may be contacted for verification of the information provided. Disclosure may otherwise be made in whole or in part to any (a) foreign government concerned if required by that government in connection with their review of your nomination and (b) pursuant to any other applicable routine use listed under AID's Civil Service Employee Office Personnel Record System, AID-2 in AID's Notice of Systems of Records for implementing the Privacy Act as published in the Federal Register, or (c) when disclosure without the employee's consent is authorized by the Privacy Act and provided for in AID Regulation 15. *(A copy of the Regulation and Notice of System of Records is available from AID Distribution on request.)*

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Department of Rural Economy and Agriculture (DREA)

African Union Specialized Technical Office on Research and Development

1993-05

West and Central Africa Maize Collaborative Research Network (WECAMAN) An Unsolicited Project Proposal

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