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WEST AND CENTRAL AFRICAN SAFGRAD MAIZE  
COLLABORATIVE RESEARCH NETWORK

INTERNAL EVALUATION

OUAGADOUGOU

DECEMBER 1988

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BUREAU DE COORDINATION  
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## I. OVERVIEW OF WEST AND CENTRAL AFRICA

Within the past two decades, maize has become an importantly increasing staple food crop of the people of the Savanna zones West and Central Africa. However, the potential for maize production has not been realized due to several constraints most of which can be resolved through research and effective transfer of technology.

The constraints to maize production in West and Central Africa as reviewed by National Programme Scientists meeting in Ouagadougou in March 1987 are presented in Appendix 1. One of the major problems that occur in both the Northern and Sudan Savanna regions is the failure by the farmers to utilize maize varieties with maturity periods suited to the various cropping systems. Biological constraints of major importance in the region include susceptibility to maize streak virus, Helminthosporium leaf blight (H. maydis), Striga spp., rust, stem borers and termites. The problem of drought also exists in most parts of the region. The agronomic constraints include problems of soil-water management and difficulties posed by low soil fertility. Unstable and often low prices for maize grain constitute a disincentive to maize farmers.

## II. NETWORK DESCRIPTION

### 2.1 Background

Resident research during SAFGRAD Phase I resulted in the development of early and intermediate maturing maize varieties. Major agronomic practices that minimize risk to drought stress such as tied ridges, soil tillage practices, use of early varieties and maize-cowpea rotation practices were also developed.



Lessons learned during the last decade indicate that regionally oriented networking activities (if properly managed) could be most efficient and cost effective. For example, through the SAFGRAD regional uniform variety trials, national programs became aware of the availability of improved varieties for the region. A major weakness of SAFGRAD I, however, was the lack of a clear definition of the function and roles of the partners involved in the implementation of various entities of SAFGRAD (i.e. NARS, IARCS, SCO and other cooperating agencies).

During the meeting of national agricultural Directors in Ouagadougou from 23-27 February 1987, it was decided that a network be established by member countries of SAFGRAD. The purpose was "to break down linguistic and political barriers and to judiciously pool human, infrastructural, material and financial resources of member countries to solve common problems of agricultural production and productivity".

In fulfilment of the directive of the Directors of Agricultural Research, SAFGRAD, organized a workshop for national program scientists working on maize in 18 SAFGRAD member countries of West and Central Africa from 23-27 March, 1987, at Ouagadougou. During the meeting, the scientists elected an Advisory Committee (Steering Committee) which prepared details of a maize research network along the lines recommended by the council of Research Directors.



## 2.2 Objectives of Network

The specific objectives of the Network as agreed on by the Directors of Agricultural Research included :

- a) to facilitate the strengthening of national agricultural research systems in terms of personnel, infrastructure, funding, etc.,
- b) to enhance the transfer of appropriate technologies (developed at NARS and international research centres) to participating national programs,
- c) to identify production constraints affecting crops, and to develop technologies in national programs as well as in IARCS to solve these problems, and
- d) to facilitate exchange of information, technologies and scientists among national programs etc.

## 2.3 Organization and Operation of Network

### a) Steering Committee

The activities of the Network are established, implemented and monitored by a Steering Committee of six active maize scientists elected by the assembly of national scientists during the biannual workshop ; and the Network Coordinator with observers from the following institutions : IITA, SAFGRAD Coordination Office, USAID (the donor agency) and INSAH.

Membership of the Steering Committee is for two years after which half of the membership shall be liable to renewal and the other half renewed through the third year : this provision is to ensure effective continuity.

The committee has the following functions :



- establish the objectives of the Network
- establish the research priorities of the Network
- provide guidelines for the implementation of the Network objectives
- monitor the implementation of the Network activities
- in collaboration with the Network Coordinator, develop collaborative research projects to be carried out by leading national centres or by IARC's in the absence of the required expertise from the national programs.

The Steering Committee meets twice a year.

b) The Network Coordinator

The Network Coordinator is charged with the responsibility of ensuring the coordination of the activities of the Network according to the objectives and strategy set up by the Steering Committee. The Coordinator is hired by the international institute directly involved in the project --IITA. He is responsible for initiating the Network, convening meetings, programming the agendas as may be required. He prepares and dispatches regional trials ; follow-up analysis ; and report to the Steering Committee. He also assists national programs in elaborating program of research and in conducting or arranging training to strengthen national programs. He is charged with the organization of monitoring tours and workshops as may be required.

The Oversight Committee of the entire SAFGRAD structure is charged with the responsibility of reviewing the progress reports of the Networks and the provision of guidelines as to how SAFGRAD should provide technical services to national research programs of member countries. The Committee



is composed of seven members, viz 5 researchers from West Africa (2), Central Africa (1), East Africa (1), Southern Africa (1) and 2 from Agricultural Universities. It is constituted by the Council of National Research Directors. Membership is for 3 years and renewable.

#### 2.4 Linkage

Linkage within the Network is effected through planning and evaluation-workshops, scientific conferences, monitoring tours, exchange of germplasm, exchange of data from regional trials, exchange of information, visits by Coordinator and visits by members of Steering Committee. Steering Committee members complement the Coordinator's efforts through on-the-spot technical assistance, especially for the weaker programs.

The Network is functionally linked with the relevant IARC's —IITA, CIMMYT for effective technical backstopping. The SAFGRAD Coordination Office provides valuable administrative support to facilitate the implementation of the Network program in the sub-region.

### III. NETWORK PERFORMANCE

A major strategy of the Maize Network has been to ensure that all national maize programs effectively participate in the Network. In this respect, strong national programs (Cameroon, Ghana, Nigeria and Togo) have been encouraged to generate appropriate technologies. These technologies (as well as those developed by regional and international research centres) are made available for testing and possible adoption by appropriate national programmes.



The following countries with relatively weak maize programs have been identified : Cape Verde, Guinea-Bissau, Guinea-Conakry, Mauritania, Mali, Burkina Faso, Tchad, Benin and Central African Republic. The countries have been given special assistance during the past two years to enable them benefit from the activities of the network.

### 3.1 Strengthening National Programs

#### 3.1.1 Visits by the Network Coordinator

A number of fact-finding visits were made by the Network Coordinator to the following relatively weak national programs during the past two years : Benin, Mali, Guinea-Conakry, Central African Republic and Chad. During these visits, the Coordinator appraised the research status of the national programs, suggested modifications where necessary and determined the roles that each national program could play in maize networking.

The Network Coordinator identified a number of problems hindering progress in most of the above national programs. These problems included the following:

- i) poor design of projects and field experiments,
- ii) inadequate research infrastructure, equipment and materials,
- iii) lack of qualified technical and scientific staff and inability to retain qualified staff because of greater financial rewards in other sectors of the economy, and
- iv) lack of scientific information.

Visits were also made by the Coordinator to some of the relatively stronger national programs such as Togo, Ghana and Nigeria.



### 3.1.2 Provision of Research Materials and Equipment

As a result of the visits to the weak national programs mentioned earlier, the Network provided them with assistance in the form of research materials. These included moisture testers, measuring tapes, pollination bags, etc (the details are in Appendix 2).

### 3.1.3 Provision of Research Funds

In addition to the provision of essential research equipment or materials, many of the relatively weak countries were allocated four thousand dollars (\$ 4000.-) each in 1988. The fund was to supplement national budgetary allocation in the management of maize trials, seed production and variety maintenance. The countries were : Benin, Burkina Faso, Central African Republic, Guinea-Conakry, Senegal and Tchad.

Some national programs are relatively strong in terms of personnel, infrastructure and maturity of their maize programs. However, all national programs are afflicted by inadequate financial resources. The Steering Committee therefore decided that some of the relatively strong national programs which have been identified as lead centres should be provided with funds to enhance their effectiveness in generating technologies for the Network. Togo (which has accepted responsibility for generating technology for streak resistance screening) and Nigeria (for agronomic research) were allocated three thousand five hundred dollars (\$ 3500.-) each in 1988.



In an attempt to improve the capability of technicians from national programs to conduct research trials, the following six technicians participated in the 5 ½ months residential training at Kamboise in 1988 :

1. Mohammed Soumanou (Benin)
2. Zoure Grégoire (Burkina Faso)
3. Badahoro-Zazomo Alphonse (Central African Republic)
4. Sow Abdoulaye (Guinea-Conakry)
5. Sidibe Issa (Mali)
6. Romtitingar Djidinray (Tchad).

The training emphasized trial management, varietal maintenance, seed production, tied ridging, data processing and interpretation.

### 3.2 Identification of Production Constraints and their Solutions

An inventory of maize production constraints in the sub-region was compiled by national scientists during the workshop held from 23-27 March 1987 together with efforts being made by each participating country to overcome these constraints. Thus, problems of common interest to all



participating countries were identified as well as the areas of strength of each national maize program. The major constraints to maize production are : lack of maize varieties with maturity periods suited to the various cropping systems, susceptibility to maize streak virus, Striga spp, stem borers, termites and drought.

In an attempt to solve the above-cited problems, research responsibilities have been assigned to national programmes on the basis of their current research capabilities as indicated by availability of qualified research staff, physical facilities and infrastructure as well as optimum ecological conditions to screen for particular environmental constraints. The responsibilities as assigned by the Steering Committee are presented in Table 1.

Table 1. Research responsibilities assigned to lead centres.

Research Area/Topic	National Program to Execute
1. Breeding for maturity and several other traits	Cameroon, Ghana Côte D'Ivoire and Togo
2. Breeding for resistance to Streak	Togo, Burkina Faso and Ghana
3. Breeding for resistance to <u>Striga</u>	Cameroon
4. Breeding for resistance to stem borers	Burkina Faso and Côte D'Ivoire
5. Agronomic constraints (production systems, soil fertility and soil physical properties).	All national programs since the real problems vary from country to another.
6. On-Farm testing of technologies	All national programs, to facilitate appropriate modifications and speedy adoption.



In collaboration with the National Programme of Burkina Faso, the Network has developed a number of extra-early maturing varieties (TZEE-W-1, TZEE-W-2, TZEE-W-3, TZEE-Y). The following drought resistant varieties have been developed from Pool 16 : Kamboinse 86 Pool 16 DR, Across 86 Pool 16 DR, Farako-Bâ 86 Pool 16 HD and Early 86 Pool 16 DR. These varieties have been made available to national programs through the SAFGRAD Regional Uniform Variety Trials.

Ghana has made available an intermediate maturing streak resistant maize variety (Abeleehi) developed from Ikenne 8149 SR BC3 and Ikenne 8149 SR BC5 for testing in the 1988 Regional Uniform Variety Trial. Streak virus disease screening facilities are available to Togo and with financial assistance from the Network, the national maize breeder is converting some of the germplasm for streak resistance. A visit to the screening facilities revealed that good progress was being made and it is hoped that Togo will soon make available streak resistant varieties to the Network for testing by member countries.

Burkina Faso and Côte d'Ivoire have the responsibility for breeding for resistance to stem borers. However, very little progress has been made in this area by the countries due to lack of funds.

### 3.3 Enhance Transfer of Appropriate Technology

#### 3.3.1 Regional Uniform Variety Trials

To enhance the exchange of germplasm among national programs of the SAFGRAD member countries, the Maize Network organizes and coordinates Regional Uniform Variety Trials (RUVT's). Varieties are nominated



by national programs, IITA/SAFGRAD and international research centres (IITA and CIMMYT). The number of trials requested by national programs has been increasing from year to year as a result of increased awareness of the potential benefits of the trials. In 1987, 52 sets of RUVT-1 (early varieties), RUVT-2 (intermediate varieties) and RUVT-3 (extra-early varieties) were sent to 16 SAFGRAD member countries. In 1988 the number of sets increased to 82.

The Regional Uniform Variety Trials have offered national programs the opportunity to identify and adopt improved varieties. Some of these varieties have reached the on-farm testing stage in some countries e.g. Burkina Faso, Togo, Ghana and Cameroon.

### 3.3.2 Provision of seed of improved varieties

Seed of promising varieties identified in the Regional Uniform Variety Trials by national programs has been provided free of charge on request.

### 3.3.3 On-Farm testing

Improved maize varieties are not widely grown by farmers in many SAFGRAD member states because of poor extension services and inadequate logistic support for varietal maintenance and seed production. In addition to the financial assistance which the network has been giving in support of varietal maintenance and seed multiplication, awareness has been created by the network about the need for on-farm testing for national programs. The result is that Togo has initiated an on-farm testing program using some of the varieties identified in the RUVT.



### 3.4 Facilitate Exchange of Information, Technologies and Scientists

#### 3.4.1 Dissemination of Research Results

Results of the Regional Uniform Variety Trials have been made available to national programs to aid them in the identification of promising varieties.

The Steering Committee recognized the fact that information on maize research findings in the different national programs was not easily available for use by scientists in the sub-region. Steps have therefore been taken to ensure that relevant publications on maize are obtained regularly from the relevant centers of IITA and CIMMYT. Special topics in special areas arising from maize Network have also been circulated to national programs. For example, the results of the adoption survey in the Brong-Ahfo region of Ghana was published by SAFGRAD and made available to all member countries of the Network.

#### 3.4.2 Monitoring Tours

In 1988, a monitoring tour was organized to Ghana and Burkina Faso which were considered as two relatively strong national programs. The tour served as a means of training scientists from the weaker national programs facilitating close personal interaction between scientists from different national programs and promoting exchange of ideas between participating scientists. Participants comprised research workers from seven countries (Benin, Burkina Faso, Chad, Guinea-Conakry, Nigeria, Senegal and Togo). The team included scientists with little experience (those from the weaker national programs and experienced scientists from the stronger national programmes. Each participant presented a report of the tour for discussion by the group on the last day of the tour.



### 3.4.3 Workshop

In an attempt to facilitate exchange of information and promote interaction among national scientists of SAFGRAD member countries, a workshop has been planned for 20-24 March, 1989 in Lome, Togo. So far 19 scientific papers have been received by the Coordinator for presentation at the Workshop.

### 3.4.4 Visits by members of the Steering Committee

Five relatively weak national programs were visited by some members of the Steering Committee during the 1988 growing. The objective of the visits was to get acquainted with the status of research and to give on-the-spot advice on proper execution of field experiments. The countries visited were :

- |                                    |                                  |
|------------------------------------|----------------------------------|
| 1. Tchad                           | Dr. Charles Thé of Cameroon      |
| 2. Cape Verde and<br>Guinea Bissau | Mr. Hema Idrissa of Burkina Faso |
| 3. Senegal                         | Dr. E.Y. Mawule of Togo          |
| 4. Gambia                          | Dr. B. Badu-Apraku of Ghana.     |

### 3.5 Documents Available

The following documents have been produced by the Network

1. Proceedings of Workshop on the establishment of SAFGRAD Research Network in Central and Western Africa, 23-27 March, 1987.
2. Report of the Second Meeting of the Steering Committee of the Maize Network for Western and Central Africa, 9-12 November, 1987.



3. Report of 3rd Meeting of the Steering Committee of the Maize Network for Western and Central Africa, 7-9 April, 1988.

4. Activities Report of Trainees (20 June - 29 November 1988)

- i) Mohammed Soumanou (Benin)
- ii) Zoure Grégoire (Burkina Faso)
- iii) Sow Abdoulaye (Guinea-Conakry)
- iv) Badahoro-Zaromo Alphonse (Central African Republic)
- v) Sidibe Issa (Mali)
- vi) Romtitingar Djidinray (Tchad).

#### IV. CONCLUSIONS AND RECOMMENDATIONS

The Steering Committee strongly supports the on-going efforts and activities of the Maize Network for Central and Western Africa and endorses its continuation through 1991.

##### 4.1 Strengths of the Network

The Maize Network is well conceived and is an appropriate way to solve common problems of maize production and productivity in Western and Central Africa. Maize is a major staple and is a principal component of cropping systems in most areas of the sub-region. The objectives of the network have been clearly defined and the steering committee is vigorously pursuing them.

The members of the Steering Committee are very active and experienced researchers and morale within the network is generally high. Despite the problems with funds, the network is struggling to build upon the foundation laid down in SAFGRAD Phase I. The participation of members of the



Steering Committee as resource person in visits to assist other national programs in the network is an indication of maturity and independence.

The regional variety trials comprised varieties nominated by national programs, regional and international trials. It is hoped that with time, the majority of these varieties will come from the national programs.

#### 4.2 Concerns and Recommendations

1. There is the necessity for National Governments to provide more funds for the operation of national research programs. This will go a long way in motivating research workers and in retaining trained man power.
2. At present, there are two maize networks in existence in the sub-region, namely, the SAFGRAD West and Central African Maize Network and the Franco-African Maize Network. The Special Programme for African Agricultural Research (SPAAR) has therefore decided that the two maize networks will not qualify to submit a supplementary proposal for funding research activities until such a time that the activities of the two Networks were harmonized. A number of meetings have been taking place among the various organizations representing the two Networks towards the harmonization of their activities. An early resolution of the present conflict is essential to the success of the Maize Network for Western and Central Africa.



### 3. Training at Higher Degree Level

The Steering Committee is strongly convinced of the need to train the maize network scientists at higher degree level. However, there is no provision made for higher degree training in the present phase of the SAFGRAD maize Network for Central and Western Africa. Appendix 3 summarizes the committee's vision of the training needs of member countries at higher degree level. This should form the basis for a future proposal for supplementary financial provision for higher degree-related training.

The short term training program for technical staff and, where necessary, researchers at Kamboinse, IITA and CIMMYT, should be vigorously pursued. In addition, visiting scientist positions at IITA and CIMMYT should also be solicited to strengthen research capabilities in member countries.

The proposed training program in computer-aided data analysis for scientists from lead centres as recommended at the 2nd meeting of the Steering Committee should be implemented.

In order to realize the impact of specific training given to maize researchers, the committee recommends that maize scientists and technicians should, as far as possible, be retained in maize research as opposed to the present policy of indiscriminate transfers/ reassignments to other fields or sectors of the various economies.



Appendix 1. Major constraints to maize production in Semi-Arid areas at West and Central Africa

a) In Northern Guinea Savanna

Constraints identified in the areas of :

Variety improvement	Agronomy	Socio-economics	Technology transfer	Training
i) Time to maturity problems (need for intermediate, early and late maturity varieties). ii) Susceptibility to diseases : Maize streak virus, Rust, leaf blight ( <u>Helminthosporium maydis</u> ). iii) Susceptibility to insect pests : Stem borers, Termites iv) Susceptible to <u>Striga</u> v) Drought stress	i) Production systems problems  ii) Soil fertility problems.	i) Non-stable pricing structure  ii) Seed preference problems.	i) Problems encountered in on-farm testing  ii) Non-availability inputs to farmers at : a) Affordable prices, b) At right time and right place	Inadequacy of institutions for staff training at levels of: M.Sc., Ph.D

b) In Sudan Savanna

Constraints identified in the areas of :

Variety improvement	Agronomy	Socio-economics	Technology transfer	Training
i) Time to maturity (extra-early, early maturity varieties needed). ii) Drought stress iii) Susceptibility to diseases: Maize streak virus <u>Helminthosporium</u> leaf blight. iv) Susceptibility to termites v) Susceptibility to <u>Striga</u>	i) Production systems problems. ii) Soil-water conservation problems. iii) Soil fertility	i) Seed preference problems. ii) Non-stable/ inadequate pricing structure	i) Problems encountered on-farm testing. ii) Seed distribution problems.	Insufficiency/ inadequacy of institutions for staff training at levels of : M.Sc., Ph.D.



Appendix 2a. Research materials distributed to the national programme of Mali.

Item	Quantity	Total price US \$
Small envelopes for seeds	1000	6
Large envelopes for seeds	1000	11
Labels	1000	9
Scales	2	77,4
Measuring tape	1	20
Hammer	1	9
Field books	10	52
Staplers	2	30
Staple boxes	2	10
Markers	12	8
Moisture testers	1	180
Technical paper (Maize variety maintenance)	Grant from IITA/SAFGRAD and CIMMYT	
NPK	200 kg	146,7
Urea	300 kg	122
Insecticide powder	11 bags	38,4
Sprayer	1	128,3
Wheelbarrow	1	58,3
Decis	66	150,7
String rollers	4	66,7
Hoes	10	40
Super simple	100 kg	70
Gunny bags	100	233,3
<b>T O T A L</b>		<b>1577</b>



Appendix 2b. Research materials delivered to the national programme of the Republic of Guinea.

Item	Quantity	Total price US \$
Pollination bags	3000	90
Shoots bags	1000	30
Triple 21-21-21	1000 kg	277
Urea	500 kg	80.9
Super phosphate	500 kg	274
Diazinon	15 l	40.4
Gazochine 10 G	10 kg	36.2
Small seed envelopes	1000	6
Large seed envelopes	1000	10.6
Labels	1000	9
Scales	1	38.7
Hammer	1	19.9
Field-books	10	52.1
Staplers	2	29.9
Staple boxes	1	5
Markers	12	7.8
Moisture tester	1	180
Technical paper (Maintenance of an experimental maize variety)	Grant from IITA/SAFGRAD and CIMMYT	
<b>T O T A L</b>		<b>1037</b>



Appendix 2c. Research materials delivered to the national programme of the Central African Republic.

Item	Quantity	Total price US \$
Urea(sacs)	5	190
NPK (Sacs)	7	2625
Wheelbarrow	1	882
Machetes	8	61.9
String rollers (200 m)	2	41.6
Combined hoes and forks	8	60.5
K. Othrine box	1	33.3
50 kg HCH bags	1	91.7
Gunny bags	200	333.3
Taxes		8.4
Moisture tester		180
Small seed envelopes	1000	6
Large seed envelopes	1000	11
Labels	1000	9
Scales	1	38.7
Measuring tape	1	20
Hammer	1	38.7
Field books	10	52
Staplers	2	30
Staple boxes	1a	5
Markers	12	8
Technical paper (Maintenance of maize experimental variety)	Grant from IITA/SAFGRAD and CIMMYT	
<b>T O T A L</b>		<b>1540</b>



Appendix 2d. Research materials delivered to the national programme of Burkina Faso.

Item	Quantity	Total price US \$
Cutler	6	16.6
Calculator (EI 356)	1	20
Calculator (EI 240)	4	48
Sprayer 16 l	2	213
Sprayer attachment	2	15.9
Rakes	5	14
Glue pots SADER	4	43.9
Painted jerry cans 20 l	2	93.3
Jerrycan power spouts	2	38.8
Slide calipers	2	15.3
Hammers N° 45	3	91
Navying shovels	5	20.7
Folding shovels	2	26.8
Navying pics	5	55.8
Hevex hoes	5	46.7
Butcher's knives	5	39.6
Plastic pans	5	19.7
Fivefold decameter	1	144.7
Plastic tape	8.4	47.6
Cloth	320 m	806.7
Plastic	10	50
Taylor labour	6-	50
Carpet marker	2	5.3
Rubber	3	3?1
Blue ball point pen	40	6.2
Bag welder	1	70
Small seed envelopes	1000	6
Large seed envelopes	1000	11
Labels	1000	9
Scales	2	74.4
Measuring tape	1	20
Hammer	1	9
Field books	10	52
Staplers	2	30
Staple boxes	2	10
Markers	12	8
<b>T O T A L</b>		<b>2223</b>



Appendix 2e : List of other countries supplied with moisture testers

1. Tchad
2. Cape Verde
3. Benin
4. Guinea-Bissau
5. Senegal.



Appendix 3. Proposed needs for training at higher degree level for SAFGRAD maize research network countries.

Country	Discipline	Level	
		M.Sc	Ph.D
Benin	Entomologist	1	-
	Pathologist	1	-
	Breeder	-	1
	Agronomist	-	1
Burkina Faso	Breeder	-	1
	Agronomist	1	-
Cape Verde	Breeder	1	-
Cent. African Republic	Breeder	-	1
Côte D'Ivoire	Agronomist	-	1
Ghana	Pathologist	1	-
Guinea-Conakry	Agronomist	1	-
	Breeder	-	1
	Entomologist	1	-
Guinea-Bissau	Breeder	-	1
	Agronomist	-	1
Gambia	Breeder	1	-
	Agronomist	-	1
Mali	Breeder	-	1
	Agronomist	-	1
	Breeder	1	-
Senegal	Breeder	-	1
Togo	Agronomist	-	1
Tchad	Breeder	-	1
	Agronomist	1	-
<b>T O T A L</b>		<b>10</b>	<b>14</b>



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