10

ORGANIZATION OF AFRICAN UNITY
SCIENTIFIC, TECHNICAL AND RESEARCH COMMISSION
(OAU/STRC)



# WEST AND CENTRAL AFRICA SAFGRAD MAIZE COLLABORATIVE RESEARCH NETWORK


## REPORT



## OF THE TENTH MEETING OF THE STEERING COMMITTEE

11 - 14 NOVEMBER, 1991
OUAGADOUGOU, BURKINA FASO

MAY 1992

SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT
INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE
(SAFGRAD-IITA)

01 B.P. 1783 OR 1495
OUAGADOUGOU 01 — BURKINA FASO

# TABLE OF CONTENTS

Page

# 1. OPENING SESSIONS

## 1.1. Joint Maize, Cowpea and Sorghum/Millet Session

After registration, the members of the Maize Network Steering Committee attended a joint opening session for the Steering Committees of the Maize, Cowpea, and Sorghum/Millet Networks in the conference hall of Independence Hotel, Ouagadougou, Burkina Faso. The opening session was addressed by the SAFGRAD International Coordinator; representatives of USAID, IITA Deputy Director General (International Cooperation), ICRISAT, the Oversight Committee of SAFGRAD; and the Director General of the National Center for Scientific and Technology Research, Burkina Faso.

### 1.1.1. Welcome address and introductory remarks by the SAFGRAD International Coordinator

The SAFGRAD International Coordinator, Dr. J.M. Menyonga, welcomed the participants to the 10th Steering Committee meetings of the Maize, Cowpea, and Sorghum/Millet Networks. In his address, Dr. Menyonga informed participants that the final evaluation report of SAFGRAD II was very favorable. However, funding for the third phase was not assured since the principal donor, the USAID, is apparently donor-fatigued. Dr. Menyonga said that USAID, however, has indicated it would provide funds for minimal network activities for a period of 18 months after the end of the present phase on December 31, 1991. Dr. Menyonga emphasized that donors would want to see that the funds they provide to the Networks are translated into increased food production and food security in SAFGRAD member countries. He, therefore, suggested that the Networks should ponder seriously over how this could be achieved during their deliberations.

### 1.1.2. Address by the Representative of USAID

The representative of USAID, Dr. W. Thomas, expressed gratitude for being invited to the meeting to share his thoughts with the members of the three steering committees. He said that it was essential that the Networks should vigorously pursue agricultural research. He added that adequate food production was needed to ensure food security in the region and that this could not be achieved if agricultural research is neglected. Dr. Thomas pointed out that many people question the impact of agricultural research because these people fail to recognise that research is a long-term venture. He, therefore, suggested that the deliberations at the steering committee meetings should aim at regenerating government interests in establishing favourable agricultural policies which would promote agricultural research in the region.

### 1.1.3. Address by the Representative of IITA Deputy Director General (International Cooperation)

Mr. E.F. Deganus, Projects Coordinator, International Cooperation Programme, IITA, addressed participants on behalf of the Deputy Director-General for International Cooperation. He informed the Meeting that IITA will continue to collaborate with NARS and to strengthen the research capacity of SAFGRAD-member countries. He pointed out that the positive and encouraging evaluation report of SAFGRAD II showed that efforts in this direction were worthwhile. Mr. Deganus said that if the current food situation in sub-Saharan Africa was to be improved, there was the need to provide adequate funds for agricultural research in the sub-region.

### 1.1.4. Address by ICRISAT Representative

The representative of ICRISAT, Dr. O.A. Ajayi, expressed his gratitude for the invitation to the meeting. He said that he hoped the meeting would strengthen the collaboration and favourable interaction between the Networks, particularly between the Sorghum and Millet Networks. He said there was good collaboration between SAFGRAD and ICRISAT, as manifested in the joint programs both organizations have carried out so far, e.g. the workshop on sorghum hybrid seed production.

### 1.1.5. Address by a Representative of SAFGRAD Oversight Committee

The joint session was addressed by Mr. Hector Mercer-Quarshie, Vice Chairman of the Oversight Committee of SAFGRAD. In his address, Mr. Quarshie said he was pleased that representatives of the International Agricultural Research Centers attended the meeting to interact with NARS scientists, adding that the Oversight Committee had always emphasized this type of interaction. Mr. Quarshie listed the responsibilities of the Networks which include:

(i) Strengthening NARS
(ii) Transfer of appropriate technology developed by IARCs to NARS
(iii) Facilitating interaction and exchange of ideas among NARS.

Mr. Quarshie also said the role of the Steering Committee included to:

(i) Determine the objectives of the Network.
(ii) Prioritize activities of the Network.
(iii) Monitor and implement the objectives of the Network.
(iv) Make technology developed by the Network available to NARS.

Mr. Quarshie opined that the positive report of the evaluation team was very encouraging and appealed to donors to sustain efforts to fund the activities of the Networks.

### 1.1.6. Opening address by the Director-General of the National Center for Science and Technology Research (CNRST)

The Director-General of the National Center for Science and Technology Research (CNRST) of Burkina Faso, Mr. Michel Sedogo, welcomed participants to Ouagadougou. He informed joint session that the purpose of networking by SAFGRAD was to promote the generation and transfer of appropriate technologies to national programs. Mr. Sedogo added that the favourable evaluation report of SAFGRAD showed that the program had been successful and congratulated all those involved in the networking activities, including SAFGRAD, NARS, and the donors. Mr. Sedogo hoped that deliberations at the 10th Steering Committee meetings would come to a successful end and declared the meeting opened.

### 1.1.7. SAFGRAD II Final Evaluation: its implications on networks research

The Director of Research, Dr. Taye Bezuneh, presented a paper entitled : "SAFGRAD II Final Evaluation Report: Its Implications on Networks Research" at the joint session. The final evaluation of SAFGRAD II was completed in July 1991. In general, the final evaluation report was very positive and established that SAFGRAD networks had effectively facilitated generation and diffusion of improved technology. Networking had also proved as an important means for promoting the growth and development of the African scientific community. The evaluation made several recommendations and stressed that, "Networks research strategies and programs should be defined independent of estimates of available project funding, but with a view toward seeking research support". Dr. Bezuneh suggested that each Steering Committee should discuss the important issues raised by the evaluation team, with a view to improving network activities.

### 1.1.8. Outlook for networks' activities, including framework for networks' impact studies

A second paper entitled "Introduction to an Impact Assessment Study of SAFGRAD Networks" was presented by Dr. T. Bezuneh, SAFGRAD Director of Research. Dr. Bezuneh reported that donors and national governments had expressed concerns regarding agricultural research. These concerns question the appropriateness of the technologies generated and whether the returns to investment in agricultural research justify further funding of such research. Therefore, an impact assessment study has been planned with several objectives, including:

(i) to assess the effectiveness of the SAFGRAD Networks in facilitating the generation and diffusion of technology to national systems;

(ii) to specify the contribution of networks in strengthening research capabilities of NARS; and

(iii) to assess the effectiveness of networks in diffusion of germplasm among NARS and between IARCs and NARS.

The protocol of the impact study was discussed at length and participants generally agreed that the study was necessary if donor interest was to be rekindled to fund the networks.

## 1.2. Attendance

### 1.2.1. Members of the Steering Committee

The following members of the Steering Committee were present at the meeting :

| Name | Title | Address |
|---|---|---|
| Dr. Charles Thé (Chairman) | Maize Breeder | IRA/NCRE, B.P. 2067, Yaoundé, Cameroon. |
| Mr. NTji Coulibaly (French Secretary) | Agronomist | IER, B.P. 438, Bamako, Mali. |
| Dr. P.Y.K. Sallah (English Secretary) | Maize Breeder | Nyankpala Agric.Expt. Station, Crops Research Institute, P.O. Box 52, Tamale, Ghana. |
| Mr. Abdou Ndiaye | Maize Breeder | ISRA, B.P. 240, CRA/Fleuve, Saint Louis, Sénégal. |
| Mr. R.A. Dossou | Maize Breeder | S.R.C.V. d'INA, B.P. 3, N'Dali, Benin. |
| Dr. E.N.O. Iwuafor | Soil Scientist | IAR/ABU, PMB 1044, Zaria, Nigeria. |
| Dr. J.M. Fajemisin | Maize Network Coordinator | SAFGRAD-IITA, 01, B.P. 1495, Ouagadougou 01, Burkina Faso. |

**1.2.2. Observers**

The following persons attended the meeting as observers:

| | |
|---|---|
| Mr. E.F. Deganus | Projects Coordinator, International Cooperation, IITA, PMB 5320, Ibadan, Nigeria. |
| Dr. S.K. Kim | Maize Breeder, IITA, PMB 5320, Ibadan, Nigeria. |
| Dr. T. Bezuneh | Director of Research, OAU/STRC-SAFGRAD, BP 1783, Ouagadougou, Burkina Faso. |
| Mr. H. Mercer-Quarshie | Manager, Nyankpala, Agric. Expt. Station, P.O. Box 52, Tamale, Ghana. |

## 1.3. Agenda for the Meeting

The following items were adopted as the agenda for the meeting by the Steering Committee:

- Approval of proceedings of the 9th Steering Committee meeting
- Network Coordinator's report
- Discussion on Coordinator's report
- Progress reports on collaborative research
- Reports on visits to national programs
- Discussion on Network's impact studies
- Discussion on ways to improve on Networks' performance
- Discussion on network's future activities including follow-up on Niamey 91 working groups' recommendations.
- Other matters
- Recommendations.

## 1.4. Approval of the Proceedings of the 9th Steering Committee Meeting

The proceedings of the 9th Steering Committee were accepted after a few ammendments were effected.

# 2. MID-YEAR REPORT OF MAIZE NETWORK COORDINATOR

## 2.1. Mid-Year Report of Maize Network Coordinator

The Network Coordinator, Dr. J.M. Fajemisin, presented his report under nine main headings, namely, Regional Trials, Collaborative Research, Funding, Visits to National Programs, Technical backstopping, Final Evaluation of SAFGRAD II, Planned Activities, and Miscellaneous.

### 2.1.1. Regional trials

Dr. Fajemisin indicated that two types of trials were prepared and dispatched for the 1991 cropping season, namely: (i) RUVT-early, and (ii) RUVT extra-early.

RUVT-early comprises 14 varieties. Nine of them were white, four were yellow, while a check entry was to be supplied by the trial collaborator.

The RUVT extra-early included for the first time streak resistant varieties. Four varieties had been converted by the Network to streak resistant (BC3F3). The trial had nine varieties and one check entry.

Dr. Fajemisin also indicated that 44 and 38 trial sets were requested for RUVT-early and RUVT extra-early, respectively, by 18 countries in West and Central Africa and by one country from Southern Africa (Malawi) for the first time.

### 2.1.2. Collaborative research

The Network Coordinator carried out the following activities to support the collaborative research efforts of the Network:

(i) Development of early maturing, drought tolerant germplasm: This consisted of the formation of six experimental varieties from 1990 Pool 16 DR progeny trials tested at five locations in four countries. Futhermore, based on the performance of the 165 full-sib families across all the five test locations, the best performing 52 families were recombined in 1991 to form cycle 4 of Pool 16 DR. In addition, Pool 16 Sequia and the early fractions of La Posta Sequia and Tuxpeno Sequia were introgressed into Pool 16 DR to widen the genetic base of the population. Finally, cycles 0, 1, 2 and

3 of Pool 16 DR and some experimental varieties generated from cycles 1 and 2 were evaluated under drought or high population density at three locations in Burkina Faso.

(ii) Development of extra-early maize: The following varieties were improved in isolated half-sib blocks and advanced to backcross 4 F1 generation (BC4F1).

i) TZEE-W SR BC3 F3
ii) TZEE-Y-SR BC3 F3
iii) CSP-SR BC3 F3

In addition, DR Composite Early White and Yellow versions were improved for husk cover and then crossed to appropriate sources of streak resistance (EV 8730SR, EV8731SR).

(iii) Downy mildew resistant accessions: The genetic bases of DMR-ESRW and DMR-ESRY were widened by crossing them with accessions in compatible colour groups from the CIMMYT Thailand Program. These accessions consist of 9 white, 10 yellow and 1 cream cultivars belonging to dent, flint, and semi-dent endosperm types, respectively.

(iv) Seed increases: Dr. Fajemisin indicated that seed increases were made for over 100 varieties, populations and accessions by controlled hand pollination.

### 2.1.3. Financial assistance to National Programs

Funds were provided to Lead Centers to assist in implementing assigned collaborative research projects. Technology Adapting Programs were also provided supplemental funds to strengthen their adaptive research activities, particularly in respect of varietal maintenance and seed multiplication. The status of the 1991 first instalment disbursement is presented in Table 1 below:

**Table 1.** Payment of first instalment of fund allocated to SAFGRAD Maize Network member countries for the year 1991.

| Country | Amount disbursed (US $) |
|---|---|
| Benin | 1,000 |
| Burkina Faso | 1,000 |
| Cameroon | 1,000 |
| Cape Verde | 500 |
| Côte d'Ivoire | 1,000 |
| The Gambia | 500 |
| Ghana | 1,000 |
| Guinea | 1,000 |
| Guinea Bissau | 500 |
| Mali | 1,000 |
| Mauritania | 500 |
| Niger | 500 |
| Nigeria | 1,000 |
| Senegal | 1,000 |
| Tchad | 500 |
| Togo | 1,000 |

### 2.1.4. Visits to national programs

In order to monitor research activities in Network member countries and to foster scientific exchanges among scientists in the Network, the Maize Network sponsored the visits of two Steering Committee members to other countries. Dr. Charles Thé of Cameroon visited the Ghana Maize Program (28 July-4 August, 1991) while Mr. Abdou Ndiaye of Senegal visited the Mali Maize Program (August 11-17, 1991).

The Maize Network Coordinator, Dr. J.M. Fajemisin, visited Mauritania to get acquainted with maize research and related activities in that country. His major findings were:

(i) Less than 1% of the land area in Mauritania is arable and, although long term average annual rainfall for this arable portion is 200-400 mm, no part of the country received up to 100 mm in the 1991 rainfed cropping season.

(ii) In spite of serious limitation in natural resources, Mauritania is making intense efforts to exploit research findings for increased food production.

(iii) Although manpower shortage is apparent, the country has participated continuously in SAFGRAD-sponsored activities.

(iv) The Government has encouraged research by providing funds and political support. It has supported and demanded progress from its peasant-oriented irrigation schemes.

(v) The parastatal project managing the irrigation schemes puts continuous pressure on research to provide new and productive technologies that would allow an intensive utilization of the irrigated land for profitable grain production (maize and rice rotation in rainfed and irrigated seasons).

(vi) There is need to assist Mauritania in its efforts to identify technological innovations by offering it places in the Networks technician training program.

Although a visit of the Coordinator was planned for Cape Verde and all arrangements had been completed, it did not unfortunately take place as a result of a last minute message that indicated the contact person for Cape Verde, Mr. Carlos Silva, was not available.

### 2.1.5. Training

The Network Coordinator informed the Steering Committee that in compliance with the decision of the 9th Steering Committee meeting, a training was held at IITA July 15-20, 1991 on the use of MSTAT Computer for data analysis. It was organized jointly by the SAFGRAD Maize and Cowpea Networks and IITA's Maize and Grain Legume Improvement Programs. The Maize Network sponsored the participation of scientists from six countries : Benin, Burkina Faso, Cameroon, Ghana, Mali, Nigeria and Togo.

### 2.1.6. Technical backstopping

In addition to assisting with the computer training, IITA provided technical backstopping to the Network by responding to the needs of national maize programs of several Network member-countries, such as provision of seed of improved germplasm for trials and specific assistance in maize improvement projects. IITA also contributed materials and expertise towards the installation of streak screening facilities at Fumesua, near Kumasi, for the Ghana National Maize Program. It is relevant to mention that the Network assisted in this venture in 1990 by allocating the sum of $3000. The facilities were already operational.

The IITA Maize Entomologist, Dr. N.A. Bosque-Perez, in the company of the national entomologist Mr. Seydou Traore, carried out a survey of Burkina Faso in September 1991 to determine if the dreaded pest, the larger grain borer (*Prostephanus truncatus*) was present in the country. This was prompted by the fact that this pest had earlier been reported in the neighbouring countries of Togo and Ghana. Samples collected through the use of the pheromone trap technique were confirmed by the International Institute of Entomology in London as *P. truncatus*. The relevant Burkinabe Government authorities were informed of this sad but inevitable development and the need to take both short and long-term measures to reduce damage by the insect.

### 2.1.7. Final evaluation of SAFGRAD II

The USAID-sponsored End-of Project Evaluation of SAFGRAD II took place April-June, 1991. The purpose of the evaluation was "to examine how and to what extent the support of the SAFGRAD II Project for four Collaborative Agricultural Research Networks for Food Crops and for the OAU/STRC SAFGRAD Coordination Office contributed to the increased efficiency and effectiveness of agricultural research and production techniques for sorghum, millet, maize, and cowpeas in semi-arid Africa".

The 3-man team, which comprised an agricultural research policy specialist, an agricultural research management specialist, and a plant breeder/agronomist, reviewed relevant project documents (including reports of Steering and Oversigt Committee meetings, workshop proceedings, monitoring tour reports) and held series of interviews with the Network Coordinators and the SCO management. The team also visited selected participating member-countries, IITA (Ibadan) and ICRISAT (Niamey) for discussions with research administrators and scientists.

Based on a critical assessment of the information obtained, "... the principal finding is that the project has been successful as designed. The project fully achieved most of the planned outputs and the expected End-of-Project conditions as identified in the Project Paper Revised Logical Framework".

The evaluation Panel observed that "SAFGRAD II clearly demonstrates the short-term and readily identifiable payoffs in regional research networking. The long-term reward of such investments will be found in the less easily perceived, but slow and steady professional growth and development of national agricultural research scientists". The report therefore concluded that, "the principal recommendation emerging from this evaluation is that AID and other donors and agencies should make at least

a 10-year commitment of financial and technical assistance to the SAFGRAD networks, including continued support for an office to assure essential network scientific direction and secretariat support".

Dr. Fajemisin also reported that, in reaction to the positive recommendations of the team, a proposal has been forwarded to USAID for a 12-18 month extension of SAFGRAD II as a transitional step towards a likely SAFGRAD III.

### 2.1.8. Planned Activities

The proposed SAFGRAD II extension envisages conducting a regional technology impact study which will serve as a test model for developing an analytical mechanism to evaluate agricultural research. There will also be a continuation of a minimum Network Program activities during the extension period.

Planned activities in the second half of the year will comprise:

(i) Analysis and collation of 1991 regional trial results.
(ii) Facilitation of the technology impact study.
(iii) Implementation of the minimum Network Program activities, as determined by budget allocation.

### 2.1.9. Proceedings of 1991 SAFGRAD Inter-Network Conference

Under the heading, "Miscellaneous", Dr. Fajemisin informed the participants that the Proceedings of the SAFGRAD Inter-Network Conference held 8-14 March 1991 at Niamey, Niger, were being processed in two forms. The editing of the scientific papers was being coordinated by consultants employed by the SAFGRAD Coordination Office. The country reports were being processed by the Network Coordinator.

### 2.1.10. Discussion on the Coordinator's Report

Following the presentation of the report of the Network Coordinator, the floor was opened for discussion. It was noted that the variety DMRESR-Y produced small cobs when grown under high population density as green or fresh maize. It was suggested that for green maize production, lower population densities, for example 40,000 to 45,000 plants/ha, should be used rather than the optimum density (66,000 plants/ha) recommended for dry grain production.

The introgression of new germplasm into Pool 16 Drought Resistance Population was discussed at length. The Coordinator indicated that all introductions would be handled in a manner that would ensure that only superior progenies arising out of crosses involving Pool 16 DR and introductions are merged with the drought resistant population. The Coordinator also assured the Steering Committee that although streak susceptible germplasm will be introduced into the drought resistant population, steps will be taken to maintain the streak resistance level of the population through selection under artificial streak infection at IITA.

## 3. PROGRESS REPORTS ON 1991 COLLABORATIVE RESEARCH

### 3.1. Report on Activities in Cameroon by Dr. Charles The

Cameroon lowland savanna maize program was given responsibility for:

- breeding for early maturity,
- breeding for drought tolerance,
- breeding for *Striga* tolerance, and
- agronomic research.

### 3.1.1. Breeding for early maturity

Germplasm evaluation: The 1991 national variety trial for early varieties consisted of 15 entries. This trial was carried out at six locations. In addition, one set was evaluated under artificial *Striga* infestation. Results obtained so far at three locations (Sanguéré, Maroua and Soucoundou) showed Pool 16 DR (7.0 t/ha) as the best white early entry while CMS 8806 (6.5 t/ha) was the best yellow early entry. SYN E2 (5.9 t/ha), a newly developed variety ranked third. However, this entry also had the poorest plant stand (40,000 plants/ha).

In 1990 also Pool 16 DR, DMRESR-W, TZESRW-SE were crossed to 1368, 9071, 5012 in order to determine their heterotic groups and also to find complementary genes that could help in improving the population. The F1 of those crosses and the parent varieties (except the inbred lines) were evaluated at four locations in 1991. Results obtained at two locations so far showed that DMR-ESRW x 5012 (7.7 t/ha) was the best cross. This was followed by DMR-ESRW x 9071 (7.6 t/ha). In general, high parent heterosis was observed on the following crosses: DMR-ESR-W x 5012, DMR-ESRW x 9071 (7.7 t/ha), Pool 16 DR x 5012 (7.0 t/ha), TZESRW-SE x 9071 (6.9 t/ha), Pool 16 DR x 9071 (6.8 t/ha), TZESRW-SE x 1368 (6.5 t/ha). The performance of the parents were: TZESRW-SE (5.9 t/ha), Pool 16 DR (4.8 t/ha) and DMR-ESR-W (4.6 t/ha).

Days to silk were increased by 2 to 3 days by 1368 and 9071 and by 1 to 2 days by 5012. A similar study done on other varieties showed that 5012 in crosses with BSR Syn I, CMS 8503 (EV 8149 SR) and BSR Syn II will allow for positive high parent heterosis.

RUVTs: The two types of RUVT were evaluated in 1991 at three locations in Cameroon. All trials were planted at 70,000 plants/ha.

Variety development: Two sets of 22 S3 lines, developed from a cross between CMS 8503 and DMR-ESRW, were visually selected based on their plant aspect and days to silking in 1989. The lines were recombined to form two synthetic varieties: Syn E1 and Syn E2. In addition, each of the lines was testcrossed to inbred lines (1368, 5012, and 9071) and the population itself (E1 or E2 as pollen-parent). Seventy-six lines from each of the two sets of testcrosses were evaluated in 1990 at three locations: Ntui, Soucoundou and Maroua. Line 1368 was found to be efficient in both the forest and the savanna zones; 5012 reacted better in the savanna, while the temperate-derived 9071 tended to be a better tester for savanna zone. The population itself used as tester was equally efficient both in the forest and the savanna zones. Lines retained by at least three testers out of four were recombined in 1991 to form two other synthetics. In addition, Syn E1 and Syn E2 were tested as varieties in two types of trial. Their performance was adequate to propose them in the 1992 regional trial.

All trials were side-dressed between 25 days and 30 days after planting. Preliminary results showed that FBC6 (7.8 t/ha) was the best entry in RUVT-early and that TZEE-W-SR CB3 F3 (6.8 t/ha) was the best entry among extra-early varieties. In general, the SR entries of RUVT extra-early outyielded their corresponding non-SR entries. However, their flowering dates were generally increased by 4 to 6 days, except for CSP-SR.

### 3.1.2. Drought tolerance research

NCRE Drought Tolerant Pool: In 1989, 163 S2 lines of the NCRE Drought Tolerant Pool were advanced to S3 under very severe moisture stress. Ninety lines were selected based on less wilting, and good synchronization between silking and anthesis. The lines were evaluated in 1990 under two simulated moisture regimes in a split-block. The main block was moisture regime:

tied vs untied ridges. The sub-plot consisted of single-row plots of the 90 S3 lines. Fifteen lines were retained on the basis of their good performance at both moisture regimes. The trial was conducted at Soucoundou and Maroua. The selected lines were recombined in 1991 to form a new cycle of drought tolerant pool. Here, S3 improvement scheme is being used. This pool will be advanced to F2 and tested in 1992 second season. In addition, line extraction will be done.

### 3.1.3. *Striga* research

Breeding: The breeding unit evaluated the following in 1991:

- 600 new inbred lines at S3-S8 generations
- 15 open pollinated early (N.V.T. early)
- 15 open pollinated late (N.V.T. late)
- 22 IITA hybrids
- 15 IITA open pollinated varieties

All trials had three to four replications and were planted on artificially infested hills. The infestation rate per hole was estimated at 2000 *Striga* seed with 60% germination. In addition, the 13 lines selected in 1990 were re-tested under higher rate of *Striga* infestation (about 4000 seeds per hill). All trials were rated twice for *Striga* damage. In addition, data were taken on *Striga* plant counts. Selected lines among the 13 advanced lines will be recombined. Those selected among the 600 new entries will be re-tested in 1992. In general, good and uniform infestation was observed in all the trials.

Agronomy: Agronomic research was carried out in diverse topics, such as:

- evaluation of different trap crops
- effects of different intercropping methods on *Striga* ; and
- effects of land preparation method on *Striga*.

Data were still being collected on all agronomic trials.

### 3.1.4. Agronomic research

In 1991, all 1990 agronomic trials on the management practices for early maize were repeated in 10 more villages. These trials included:

- time of N application, and
- N x plant density

Two maize varieties were used: TZEEF-Y and Pool 16 DR.

## 3.2. Report on Activities in Ghana by Dr. P.Y.K. Sallah

Ghana as a Lead Center has responsibility for developing:

(i) Varieties of different maturities.
(ii) Varieties with resistance to the maize streak virus.
(iii) Varieties which are tolerant/resistant to *Striga*.
(iv) Varieties which are efficient in utilization of nitrogen.

The major research activities conducted during the 1991 season are summarized in this report.

### 3.2.1. Population improvement:

The populations under improvement are the 120-day white dent (full season); 120-day yellow flint (dent); 105-day white dent (medium maturity); 90-day white dent (early maturity); and 90-day yellow flint/dent.

120-day yellow flint/dent population: Full-sib families from this population were evaluated at three locations in 1989. The top 10 families were recombined to form an experimental variety in 1990. In addition, the best 28 families were recombined to form the first cycle (C1) of improvement in this population. In 1991, the experimental variety was grown in a half-sib recombination in

isolation to increase seed for field evaluation. In addition, the C1 material was grown in a half-sib block and Suwan 1-SR was introgressed into the population but keeping the introduction as females only. The resulting crosses with the introductions will be evaluated before they are fully merged with the population.

105-day white dent population: One-hundred and forty-two full-sib families, extracted from the 105-day white dent pool in 1990, and 2 checks were evaluated at three locations using a 12 x 12 simple lattice design with two replications per location. The objective is to extract an experimental variety from the pool and to introgress the superior fraction of the pool into the 105-day white dent breeding population for further improvement.

90-day white dent population :One-hundred and forty-two full-sibs, generated from the population, and two checks were evaluated at three locations as described in the previous section. The objective is to continue the cyclical improvement of the population.

90-day yellow flint/dent population: Approximately 144 full-sib families were extracted from the population during 1991 for evaluation in progeny tests in 1992. The objectives were: (i) to continue cyclical improvement of the population for yield and other agronomic traits, and (ii) to extract an experimental variety from the population.

Improvement of grain and flour quality of Okomasa and Abeleehi: The soft chalky type of endosperm of local maize is preferred for local food preparations in Ghana. In addition, the local maize varieties have tighter tip cover compared to improved varieties. The objective of this program is to transfer the desirable grain and flour qualities from local varieties to improved varieties (Okomasa and Abeleehi) through backcross breeding. Selected BC3 S1 lines were recombined during the second season of 1990. The two materials were advanced to the F2 stage for inclusion in the

national variety trials during 1992. In addition, the BC3-S1 lines of each variety were crossed to the respective recurrent parent to produce the BC4 generation which was selfed during 1991 to form the BC4 S1 generation. The BC4 S1 material will be advanced to the BC4 S2 stage during 1992.

Nitrogen use efficiency: Nitrogen is a major plant nutrient which influences the productivity of maize. The available N is usually low in most soils, and where maize is grown, N fertilizers are often recommended. High N fertilizer costs and the danger of contaminating the environment with residual nitrates are concerns. Therefore, maize varieties which utilize N more efficiently and require low levels of N fertilization to produce high grain yields would be desirable. The objective of this program, therefore, is to develop maize varieties which require low levels N fertilizers to produce acceptable grain yields.

One hundred and forty-four S1 progenies extracted from 120-day white dent pool were evaluated under 40 kg N/ha (low N) and 200 kg N/ha (high N) in two separate field experiments but grown adjacent to each other at two locations in 1991. The best S1 lines will be selected to form experimental variety under each N level and across N levels.

### 3.2.2. Hybrid Program

Development of heterotic populations

120-day white dent female population: Based on yield and agronomic potential, the 120-day, white dent breeding population was identified in 1986 as the female parent for hybrid development. During the second season of 1991, S3 lines of Pop 21, Pop 49 and TZPB were introgressed into the female population to broaden the genetic base. Each introduction was kept separately as female only and the crosses will be evaluated during 1992 before they are fully merged with the population.

120-day white dent male population: A male population with high heterosis with the female population is being formed for hybrid development. Results of topcross evaluations showed that TZB SR, EV8444 SR and CIMMYT Pop 42 combined well with the female population. The three materials were composited in the 1989 major season and the synthetic was improved through the first cycle by the half-sib recombination scheme during the 1990 minor season. The selected half-sib families were grown in a half-sib recombination block in isolation in the 1991 major season. Earlier attempts to introgress Suwan 1 white into the population failed and this will be done during 1992.

Inbred line development in Giant composite and Composite-W: Inbred line development in Giant composite and Composite W was initiated in 1987. The S5 lines were advanced to the S6 stage during 1990 minor season. In addition, the S5 lines were topcrossed to four testers of varying genetic background (i.e. 9071, 5012, 2097 and 1368). The topcrosses were evaluated in replicated trials in an attempt to determine the combining ability patterns of the lines from each source population.

Screening for resistance to *Striga* in maize: *Striga hermonthica*, a weed parasite of maize and other cereals, is widespread in the savanna zone of Ghana, causing considerable yield reduction in maize in heavily infested fields. Development of resistant cultivars is one of the approaches to control *Striga*.

*Striga* seeds, collected from farmers' fields during 1990, were used to establish *Striga*-sick fields at Nyankpala for screening germplasm for resistance to the parasite.

Several trials were conducted in the *Striga*-sick plot during 1991 and these included:

(i) Evaluation of early, intermediate and full-season varieties and populations in the breeding program.

(ii) IITA *Striga* open-pollinated maize variety trial.
(iii) IITA *Striga* hybrid maize trial.
(iv) IITA *Striga* inbred maize trial.

The objective of these trials is to identify materials with tolerance to *Striga*.

### 3.2.3. Agronomy research on *Striga*

Three trials were conducted in 1991 with the aim of reducing the incidence of *Striga* on maize. In the first trial, the effects of source and rate of nitrogen fertilizer on the incidence of *Striga* was studied. Ammonium sulphate and urea were the two sources investigated at 0, 90, 120 and 150 kg/ha. In the second experiment, manual and chemical methods of preventing seed set by *Striga* were evaluated. Lastly, the effect of crop rotation and intercropping systems on reducing *Striga* population was studied. All trials were established on fields which were abandoned by the farmer because of *Striga* infestation.

The trials relied entirely on natural infestation; that is, artificial infestation was not carried out on these fields.

### 3.2.4. Streak Screening Facilities

The streak screening facility being constructed at Fumesua for screening germplasm for resistance to the maize streak virus (MSV) has been completed and it is now fully operational. Materials for the facility were donated to the Ghana program by IITA which also provided expertise to set it up. SAFGRAD also provided funds for setting up the facility. The Ghana Program is grateful to both IITA and SAFGRAD for the facility which will greatly enhance streak resistance breeding. We have continued to lay emphasis on the development of streak resistant varieties, populations, and inbred lines by using streak resistant germplasm from the national program as well as from IITA and SAFGRAD.

### 3.2.5. Variety testing

Station variety trials (SVTs): Three types of station variety trials were conducted during 1991. Full-season varieties were evaluated in SVT-1, while medium maturing varieties and early varieties were screened in SVT-2 and SVT-3, respectively. The objective of these trials was to compare varieties developed in the national program with those developed elsewhere as a means of recommending varieties for on-farm testing and eventually for release. Each trial was conducted at six locations.

Five open-polinated and five hybrid varieties were tested in SVT-1, six open-pollinated varieties in SVT-2, while eight open-pollinated varieties were evaluated in SVT-3. The design for all three trials was a RCB with four replications per site. Harvesting of all trials had been completed but the data were yet to be analysed.

Regional Uniformity Variety Trials (RUVTs): Three sets each of RUVT Early and RUVT Extra-Early were conducted in Ghana. This is the first time the extra-early variety trial was conducted with the objective of identifying superior extra-early varieties for Ghana. It is envisaged that the extra-early varieties could be planted and harvested early to fill the hunger period which occurs in the savanna zone of Ghana. Harvesting of all trials had been completed and data processing was in progress.

### 3.2.6. Breeder's Seed Production

Breeder's seed was produced for all recommended varieties under consideration for release. The varieties are Okomasa, Abeleehi, Dorke SR (early, white dent), Golden Crystal (intermediate, yellow dent), GH8363 SR (full-season, white dent). Breeders seed of these varieties will be sold to the seed producing agencies for commercial increase.

## 3.3. Report on Activities in Nigeria by Dr. E.N.O. Iwuafor

The Nigerian report as a SAFGRAD Maize Lead Center covers the progress made in 1991 season.

### 3.3.1. Maize Regional Trials:

The objective of these regional trials is to test the adaptability of newly developed, extra-early, early and late/intermediate maturing varieties of maize.

RUVT-Early: These are drought resistant early maturing varieties with a maturity cycle of 90-95 days. The trial was first established in 1988 at Samaru with 13 entries. In 1989, it was repeated at Samaru with 14 entries while in 1990, it was sited at Minjibir.

In 1991 season, the trial consisting of 14 entries was established at Samaru and Malumfashi in the northern Guinea and at Minjibir in the Sudan savanna. The trials had been harvested and results were being compiled.

RUVT Extra-Early. The RUVT Extra-Early, consisting of 10 entries in 1991, was established at Samaru, Malumfashi and Minjibir. Harvesting had been completed and results were being compiled.

For all these regional trials, fertilizer was applied at the recommended rates of 120 kg N $ha^{-1}$, 60 kg $P_2O_5$ $ha^{-1}$ and 60 kg $K_2O$ $ha^{-1}$. Management of the trials followed the recommended cultural practices for growing maize in the savanna. Records were taken as instructed by SAFGRAD.

### 3.3.2. Hybrid maize variety trial:

The main objective is to identify the most adapted hybrid maize variety for the northern Guinea and Sudan savanna agro-ecological zones. This trial was started in 1990 cropping season at Samaru. Eight hybrid maize varieties were used with an open pollinated variety -TZBSR- as a check. A randomized complete block design was used with four replications. Recommended plant density of 50,000 plants per ha and fertilizer rates of 120 kg N $ha^{-1}$, 60 kg $P_2O_5$ $ha^{-1}$ and 60 kg $K_2O$ $ha^{-1}$ were used. The results showed that the grain yield and 100 grain weight of the hybrids were not significantly higher than those of the check, open pollinated variety. In 1991 season, eight new hybrids from one of the local seed companies (AG SEED) were added and tested at Samaru. The trial was just about to be harvested and reliable results were expected.

### 3.3.3. Agronomic trials for management of early and extra-early varieties

(i) Response of early and extra-early maturing varieties of maize to rate and time of nitrogen application.

The main objective of the trial is to determine the effects of rate and time of N application on the productivity of early and extra-early maize varieties.

The trial was started in 1990 at Minjibir. An extra-early variety (TZEF-Y) and an early variety (TZESR-W) were used. Five rates of N fertilizer (0, 40, 120 and 160 kg N $ha^{-1}$) were applied at three different times (viz., all at planting, half at planting followed by the other half 14 days after planting (DAP), and half at planting followed by the other half 28 DAP). A split-plit plot design was used with N fertilizer as the main plot, variety as sub-plot and time of application as the sub-sub plot. There were

four replications. Results obtained showed that there was significant N x variety interaction, although the main effect of N was not significant. TZEF-Y outyielded the early variety TZESR-W. Applying half of the N fertilizer at planting and the rest at 14 DAP gave the best yield. Application of N increased the plant height generally. Time of N application had no significant effect on plant height but spliting of the N increased the 100 grain weight. The trial was repeated in 1991 at both Minjibir and Samaru. Harvesting had started and an excellent result was being anticipated.

(ii) Response of early and extra-early maturing varieties of maize to plant density.

The trial was conducted to determine appropriate plant densities for early and extra-early varieties of maize.

The trial was started in 1991 cropping season at Samaru and Minjibir. At both locations an extra-early variety (TZEF-Y) and an early variety (TZESR-W) were planted at five plant densities (27,778; 55,555; 66,666; 74,074; and 111,111 plants $ha^{-1}$) using a randomized complete block design with four replications. The crops had not been harvested but reliable results were anticipated.

## 3.4. Report on Activities in Mali by Mr. Ntji Coulibaly

During the 1991 cropping season, the national maize program conducted different trials including national variety trials, elite variety trials, adaptive variety trials, on-farm verification trials, and seed multiplication on 37 sites across the country's maize growing region.

The rainfall distribution and quantity in 1991 were very sufficient. Harvesting was not yet over. However, promising results across the experimentation sites were expected. Data would be compiled and analysed for the annual report.

Constraints and recommendations for the Mali national maize program have been highlighted in the report at the present meeting by Mr. Abdou N'Diaye (see Section 4.2. below).

## 3.5. Report on Activities in Senegal by Mr. Abdou Ndiaye

Maize is an important food crop, particularly for the "hunger period", when it is consumed "green" 3-4 weeks before the harvest of early millet called "Souna".

Maize research activities were regularly carried out in two main areas in Senegal: (i) rain-fed, and (ii) irrigated.

### 3.5.1. Rainfed maize

Breeding: Three types of SAFGRAD regional trials were conducted in 1991, namely: RUVT-early, RUVT extra-early, and Pool 16 DR IPTT. They were planted at two locations: Sonkorong and Nioro Station. The data had been collected and would be analysed later. Also, seed increase was done at Nioro Station for Pool 16 DR C1, DMRESR-W, SAFITA-2, and TZESRY-F3.

Agronomy: NPK equilibrium trial, with a centrally composed rotative design, was planted at Nioro Station. Economic analysis will be done after the data had been collected.

### 3.5.2. Irrigated maize

Along the river valley, research activities have resulted in the identification of early to intermediate varieties of white or yellow grain types. The following trials were conducted:

Breeding:

(i) Recombination of nine parents identified from earlier trials to create a yellow composite with a wide genetic variability.

(ii) Heterotic pools: Thirty-six populations and varieties were crossed in 1991 season using the "paired parent" and the bulk method. The F1 will be tested in 1991 off-season.

(iii) Materials in seven trials from IITA and CIMMYT, including yellow and white hybrids, as well as mid-altitude populations and hybrids were tested in order to broaden and/or to assess their genetic variability and performance under irrigation.

Agronomy: The following experiments were conducted:

(i) NPK equilibrium studies;
(ii) effects of soil physical properties on rooting and maize development;
(iii) characterization of different soil types in relation to maize cultivation; and
(iv) determination of optimum moisture requirement of irrigated maize.

Entomology: Trials conducted in 1991 included: studies on population dynamics, yield loss assessment, and varietal screening for tolerance/resistance to stem borers.

## 3.6. Report of Activities in Benin by Mr. Romuald Dossou

During 1991 cropping season, the maize research program conducted a number of trials including national, SAFGRAD, and IITA trials across locations in breeding, agronomy and crop protection.

### 3.6.1. Breeding:

- Progenies from the diallel cross in 1989 were recombined in 1991 to create two white floury varieties (early and late).

- The half-sib method was used to improve some characteristics of TZB-SR in the northern Benin. Also, seeds of 21 varieties were multiplied for 1992 trials by bulk-sibing.

- National advanced trials involving early varieties (ENAVAP) were conducted in five locations and on late varieties (ENAVAT) in four locations.

- Five SAFGRAD regional trials (three sets of RUVT early and two sets of RUVT extra-early) were conducted in different locations. Data had been compiled for analysis.

- IITA trials including EVT-LSRW, EVT-ISR and lowland hybrid trials were also conducted.

### 3.6.2. Agronomy:

Studies had been going on since 1990 to identify adequate plant density, as well as nitrogen rate and time of application on early and extra-early maize varieties in the Borgou Division, north of Benin.

### 3.6.3. Crop protection:

Three crop protection trials were conducted, two on *Striga* and one on stem borers.

The *Striga* trials included the study of the effect of maize planting date on *Striga* germination and the effect of nitrogen fertilizer on *Striga* seed germination and development in a maize plot.

Less infestation by stem borers was found in 1991 compared to 1990.

### 3.6.4. On-farm trials:

In 1991, 114 on-farm trials on varieties and fertilizer use were conducted across the country. All the trials had already been harvested. The results would be compiled and analysed. Farmers preferences among promising varieties included TZPB-SR and DMR-ESRW.

## 3.7. Report on Activities at IITA by Dr. S.K. Kim

After he had given some highlights on maize research at IITA in 1991, Dr. S.K. Kim focussed his presentation on the future reorganization of the research activities. All the activities will be regrouped in the following three programs:

- Crop Improvement Program,
- Plant Health Program, and
- Resource and Crop Management Program.

The main research focus in maize at IITA in 1991 included resistance breeding against *Striga*, drought and stem borers. The most promising maize hybrid that combines resistance to *Striga* with high grain yield is 9021-18SRSTR. Dr. Kim also indicated that IITA maize genotypes resistant to *S. hermonthica* showed also high resistance to *S. asiatica* in Togo. Two maize scientists one each from Cote d'Ivoire and Zaire visited IITA during harvesting period for three and four weeks, respectively, in 1991. This was in line with the 9th Steering Committee meeting recommendations.

Members of the Steering Committee discussed the reorganization of IITA research activities as well as how to encourage local utilization of maize. Dr. S.K. Kim said that the above changes would not affect IITA collaboration with NARS in maize research. He also suggested that African scientists should speak out so as to make decision makers interested in local utilization of maize, such as in local breweries.

The Committee noted that multilocational testing of *Striga* resistant materials was sucessfully carried out in Nigeria, Cameroon, Ghana and Togo in 1991. Artificial infestation was made at each testing site using the technique developed at IITA. *Striga* research is the top priority subject and any interested national program is encouraged to collaborate.

# 4. REPORT ON VISITS BY STEERING COMMITTEE MEMBERS TO NATIONAL PROGRAMS

## 4.1. Report on Visit to Ghana by Dr. Charles The

Dr. Charles The visited the Ghana maize program from 28 July to 4 August, 1991.

### 4.1.1. Objectives:

The objectives of the visit were:

- To monitor maize research activities of Ghana so as to get acquainted with all the genetic material and staff of the program.
- To share scientific information and materials.

### 4.1.2. Research Program

Maize research in Ghana is under the CIDA (Canadian International Development Agency) project which was established in Ghana in 1979; the objective was to assist the government in strengthening research capability in maize as well as in other crops, such as cowpea, soybean and groundnut. Administratively, the CIDA project is under : (i) the Ministry of Agriculture; (ii) the Crop Research Institute, and (iii) the Ghana Grain and Legumes Development Board. The program is backstopped by CIMMYT although the legume component was subcontracted to IITA.

The Maize research program comprised four research units: Breeding, Cropping System, Socio-Agro-Economy, and Crop Protection.

Five maize varietal types are required in Ghana.

(i) 120-day white dent (60% of total production);
(ii) 105-day white dent (15% of total production);
(iii) 90-day white dent (5% of total production);
(iv) 120-day yellow flint/dent (10% of total production); and
(v) 90-day yellow flint (5% of total production).

To date, seven maize varieties and five legumes varieties have been released.

### 4.1.3. Research activities in Kumasi

A total of 14 field trials were visited; a few comments on some of the trials are provided below.

(i) **Ghana inbred lines**: Most of these lines were obtained from S3 lines of population 43. Those lines were being crossed to three testers: 9071, 1368 and 5012. In addition, some specific single crosses were made with TZMI 101, B73, 1188 and 9091. The best looking line was Ghana 3 while the most promising crosses were said to come from crosses having GH30 and GH31 as one of the parents. I also observed some 3-way crosses using an inbred line as female.

(ii) **QPM inbred lines**: These lines were developed from population 63. Most of the lines are streak susceptible. The objective here was to obtain improved QPM hybrid and/or synthetic which was required by Global 2000 project which was helping in setting up a laboratory for screening quality protein maize genotypes.

(iii) **Male population for population 43**: This was a composite variety in isolated half-sib recombination block. Entries included: TZBSR, population 42, population 44, and Suwan 1 white.

(iv) **Station variety trials (S.V.T)**: Three types of station variety trials were observed. The three sets corresponded to the three maturity groups handled by the program. These were:

* S.V.T-1: comprised 10 entries evaluated in four replications. The entries included 3-way crosses, single crosses, and a local check. The promising entries were P15 x P22, a QPM single cross; and (GH20 x 1368) x 5012, a 3-way cross.

* S.V.T-2: comprised six entries, the most promising being Abeleehi.

* S.V.T-3 was made of 8 entries. The three promising entries seemed to be Dorke SR, Across 87 Pool 16 SR, and DMR-ESR-W.

(v) **QPM varietal trial**: This trial comprised 14 QPM varieties and 2 checks. Entries were in the observation nursery trial planted in 2-row plots.

(vi) **QPM top crosses**: This trial was made of 30 varieties and hybrids obtained by crossing QPM populations with some inbred lines as well as with some varieties.

(vii) **Top cross evaluation of EV 8444 SR**: This trial comprised full-sib progenies, derived from this population, with population 43.

(viii) **Giant composite and composite white**: This trial comprised topcrosses of lines, derived from these two populations, with population 43.

(ix) **Nitrogen depleted plot**: This plot was about 1 ha and was planted with maize in an attempt to deplete the soil of its nitrogen. The plot will be used to screen inbred lines and populations for nitrogen use efficiency.

### 4.1.4. Research activities in Nyankpala

At this station, with an average rainfall of 1000 mm, I was welcomed by Dr. Peter Y.K. Sallah. Most of the trials were about 2 weeks after flowering. However, some full-sib trials were about to flower. All trials were very well maintained. Ten trials were visited at the station. These included the 105- and 90-day full-sib evaluation planted in a 12 x 12 lattice design. These two trials were very promising. The QPM variety trial which was earlier observed at Kumasi also looked good at Nyankpala.

Trials visited in Nyankpala included:

(i) **R.U.V.T Extra-Early**: This trial looked very promising in spite of some damage on some entries by black ants. The promising entries were CSP, CSP x L. Raytiri F6, TZEE-W-SR and TZEE-Y-SR. The new SR entries were better agronomically than their corresponding non-SR entries.

(ii) **R.U.V.T. Early**: The promising entries here were: Across 86 Pool 16 SR, Ikenne 88, BU ESR-W, Kamboinse 88 Pool 16 DR, and TZESRW-SE.

(iii) **E.V.T. LSR-W:** The promising entries were EV8443SR, Mokwa 87 TZPBSR and CMS8710.

(iv) ***Striga* sick plot**: This plot was planted only 2 weeks before my arrival. Plots were artificially infested with *Striga* at the rate of about 2500 seeds per hill. The plot comprised the two IITA *Striga* observation trials as well as materials from the three maturity groups.

### 4.1.5. Facilities

The Ghana program is very well equiped; the followings were observed.

- Adequate research land.
- Adequate irrigation facilities.
- Streak screening facilities.
- Adequate seed preparation room.
- Good cars for researcher (except in Nyankpala).
- Good and dedicated staff.

#### 4.1.6. Conclusion and Recommendations

(i) Fumesua and Nyankpala Stations, both of which have irrigation facilities, could make better use of them in advancing materials faster than they were doing.

(ii) Although it does not appear to constitute a problem now, excessive use of population 43 could lead to disaster, especially as it is known that Tuxpeno materials are very susceptible to *Striga*, ear rot, and storage insects.

(iii) The current level of support for maize research activities in Ghana should be maintained or enhanced.

## 4.2. Report on Visit of Mr. Abdou Ndiaye to Mali

Mr. Abdou Ndiaye from the Senegalese National Program visited the Mali program from August 11 to 17, 1991.

After he had been introduced by Mr. N'Tji Coulibaly, the Leader of the Mali national maize program, to Mr. Panganignou Dolo, the Head of the Food Crop Research Section, Mr. Abdou NDiaye stated the objectives of his visit.

Maize occupies an important place in the food self sufficiency effort of Mali. Although it is less dominant in the north, maize is grown on thousands of hectares in the southern region of Mali. Mr. Abdou Ndiaye visited the following research stations and sub-stations.

**4.2.1. Visit to Experimental Stations and Sub-Stations:**

**Sotuba station**: Mr. Ndiaye visited several trials including RUVT, national variety trials, IITA collaborative trials, and seed multiplication plots. Sotuba is the main research station for maize in Mali. The promising entries from selected trials are as follows:

| Name of Trial | Promising entries |
|---|---|
| RUVT extra-early | TZEE-W x Gua 314 BC1 F6, CSP, CSP-SR, TZEF-Y, |
| Elite variety trial | TZEE-Y, EV8422-SR, SUWAN 1-SR, TZB-SR |

**Katibougou sub-station**: At this sub-station with about 600 mm average annual rainfall, Mr. Ndiaye visited one national early variety trial containing 29 entries. Plants were only one month old but looked promising.

**Massantola sub-station**: Mr. Ndiaye visited RUVT extra-early, verification trials, and seed multiplication plots. The entry TZEE-Y appeared to be the earliest of the RUVT extra-early materials (it attained 100% silking about one month after planting) while CSP appeared to be the most vigorous variety in the trial.

**Sougoula seed production station**: This 100 ha station is located in the cotton production company area where maize is usually grown in rotation with cotton. Mr. Ndiaye visited two trials (one Elite variety trial and a DMRESR-Y seed multiplication plot).

**Longorola sub-station**: Mr. Ndiaye visited two trials (a verification trial and an inter-hybrid trial) at this sub-station where the average annual rainfall is about 1100 mm. He also visited four, on-farm verification trials in four villages around the sub-station. The villages are Diomanténé, Dianaba, Zanadougou and Kaboïla. These villages are excellent sites for screening for resistance to *Striga* and streak virus.

### 4.2.2. Observations and Recommendations

Mr. Ndiaye observed the good working relationship existing between the Mali national maize research program and the extension services, such as the Cotton Company. This Company is also the major maize production extension service.

The national maize program approach in conducting on-farm verification trials was appreciated by Mr. Abdou Ndiaye. This approach seemed to be an adequate way to transfer new improved maize varieties into farmers' fields.

Mr. A. Ndiaye also highlighted the well managed trials conducted by the Mali maize program with limited logistic, financial and human resources; there were only 2 research scientists and 2 technicians. However, there is a possibility to have trainees from the "Institut Polytechnique Rural", the country's main agricultural training institute. Finally, Mr. Abdou Ndiaye made the following strong recommendations:

- There is necessity to reinforce the maize personnel by hiring a maize breeder and several qualified field technicians

- A vehicle should be provided to the Mali Maize Program to facilitate the execution of on-station and on-farm verification trials.

- A micro-computer should be supplied to the maize personnel for better and faster analysis of field data from the numerous trials.

# 5. DISCUSSION OF PROPOSED IMPACT STUDY OF THE NETKORK

The Steering Committee recommended that the following countries (in order of priority) should be visited during the proposed Maize Network impact study: Burkina Faso, Mali, Benin, Cameroon, Ghana and Togo.

It was pointed out that any country selected for the maize impact study is expected to provide information on all the other SAFGRAD mandated crops grown in that country. The final selection of the three Steering Committee members from the Maize Network for the impact study will be done by the SAFGRAD Director of Research, in consultation with the Network Coordinator.

# 6. DISCUSSION ON WAYS TO IMPROVE ON THE NETWORK'S PERFORMANCE

## 6.1. Issues Arising from SAFGRAD Project Final Evaluation

Formal funding for SAFGRAD Phase II officially ends on December 31, 1991. The Steering Committee was informed that following the favourable report of the evaluation team, USAID has indicated that some level of project funding would be maintained for 12 to 18 months. Funding during the interim period will enable some minimal project activities to be undertaken in anticipation of approval of funds for Phase III by the donors.

The Steering Committee took note of the recommendation by the evaluation team that the networks research strategies and programmes should be defined independent of estimates of availability project funding, but with a view to seeking research support. Therefore, the Committee discussed ways and means of improving the performance of the Network. It was suggested that:

(i) IPTTs should be conducted in specific research areas, such as *Striga* resistance/tolerance selection, in addition to the normal IPTTs and the RUVTs.

(ii) Though the recovery of data from regional trials is high and commendable, this could be improved and scientists should strive to achieve this.

(iii) The following format should be adopted for future projects reports submitted to the Network:

- Title of project
- Objectives
- Background
- Activities for the current period
- Outlook or planned future activities.

(iv) Lead Centers are defined as countries which have reasonably adequate personnel, facility and resources to carry out research in assigned area(s). Associate Centers are countries evolving towards the characteristics of Lead Centers. Weak Centers are those countries which do not have adequate personnel, facility or resources to generate technology and only participate in adapting the technologies developed by the more capable NARS or by the IARCs.

(v) Interdisciplinary research should be emphasized, for example, *Striga* control.

(vi) Objectives of projects should be defined for the short-and long-term.

## 6.2. Network's Future Activities Including Follow-up on Niamey, 1991 Working Groups' Recommendations

### 6.2.1. Maize breeders working group:

The following priority research areas were proposed by the Maize Breeders Working Group in Niamey 1991: (i) *Striga*, (ii) drought, (iii) heterotic patterns, (iv) soft endosperm, (v) N use efficiency, and (vi) stem borers.

The Committee discussed the progress made so far on initiating research activities in the above areas.

(i) *Striga*: Research on *Striga* is currently going on in Ghana, Cameroon, Togo, Benin, and IITA. *Striga*-sick plots were established for screening for *Striga* resistance, in Ghana, Cameroon, Benin and at relevant stations of IITA. Evaluations of cultural practices to control the incidence of *Striga* are in progress in Ghana and Cameroon. The Steering Committee endorsed Benin as an associate lead center for *Striga* research.

(ii) Heterotic pattern: After agreeing that little information is currently available on heterotic patterns of germplasm adapted to the lowland tropics, members did not support the suggestion that a seminar be organized at IITA to specifically discuss this issue. However, it was suggested that at its convenience IITA should invite scientists working on heterotic patterns to discuss progress made so far and plan for the future.

(iii) Soft endosperm: One experimental variety trial comprising varieties would be offered to NARS during 1992. Cameroon, Ghana, and IITA will provide soft endosperm varieties for the trial. Other countries that have soft endosperm varieties are encouraged to propose them for the trial but should provide 3.0 kg seed for each variety.

(iv) N use efficiency: Some research in this area has been initiated at IITA and by the Ghana national program.

(v) Stem borers: The Committee suggested that IITA should make available to NARS any stem borer resistant/tolerant populations developed so far.

(vi) Other matters

(a) In 1991 IITA invited some national scientists during harvesting of materials and they spent two weeks looking at services and trials at IITA.

(b) The computer training course was held at IITA for a week. Steering Committee members who attended the course were of the view that the course was too short and that duration of future courses should take into account the background of the participants.

(c) The course on hybrid seed production will be held in December 1991.

### 6.2.2. Agronomy Working Group

At Niamey 1991, the Agronomy Working Group identified the following researchable areas: (i) nitrogen fertilizer use, and (ii) soil conservation.

Progress in these areas was discussed by the Steering Committee.

(i) Nitrogen fertilizer use: It was proposed that current information on the economic analysis of fertilizer recommendations should be compiled for Nigeria, Ghana and Mali and that this information should be presented at the next meeting of the Steering Committee. This proposal was made in view of the rising cost of N fertilizers following the removal of subsidies by governments in all NARS countries.

(ii) Regional agronomic trials: To avoid duplication of research by COMBS, Dr. Winslow, Director of IITA Maize Program offered to consult with COMBS officials to know what COMBS was doing in the region regarding agricultural research. However, Dr. Winslow was not present at the 10th Steering Committee meetings. Dr. Kim, IITA Maize Breeder, offered to contact Dr. Winslow and to communicate the information obtained to the Coordinator of the Network.

(iii) Training: This recommendation is in line with the six-month course which is offered by SAFGRAD to technicians. However, it was suggested that agronomy should be emphasized a little bit more in future courses.

(iv) Other issues: The use of organic wastes as well as leguminous plants in rotation or in association with cereal crops was strongly proposed as a means to sustain the productivity of the fragile and inherently poor soils of the region.

### 6.2.3. Plant Protection working group:

The Steering Committee was of the view that the propositions of the plant protection working group were observations and they were, therefore, not discussed any further.

## 7. RECOMMENDATIONS

The Steering Committee after its deliberations came up with the following recommendations.

1. In view of the general lack of adequate number of well trained personnel in maize research in Africa, particularly in crop protection, it is highly recommended that long-term training should be emphasised during SAFGRAD Phase III.

2. In view of the huge success that has been scored through SAFGRAD networking, it is recommended that donors reconsider their position on funding the Project.

3. The principles of the impact assessment study outlined by the SAFGRAD Director of Research have been endorsed by the Steering Committee and it is recommended that all necessary steps should be taken to ensure the success of the study.

4. For the sustainability of the soils of the region which are inherently poor, and in view of the rising cost of inorganic fertilizers, the promotion of the use of organic wastes and of planting leguminous plants either by intercropping or in rotation with cereals is highly recommended.

5. In view of the serious danger posed by the larger grain borer, *Protephanus truncatus*, which has been reported in Togo, Ghana and recently in Burkina Faso, it is highly recommended that urgent and concerted action be taken by the IARCs working on maize, in consultation with the NARS of these countries, to control and limit the spread of the pest in the region.

6. Lack of high quality seeds is one of major constraints causing slow adoption of new, high yielding and disease resistant maize varieties. Privatization of the seed industry is highly recommended.

1992-05

# Maize and Cowpea Collaborative Research Networks for West and Central Africa, report of the tenth meeting of the steering committee

AU-SAFGRAD

AU-SAFGRAD