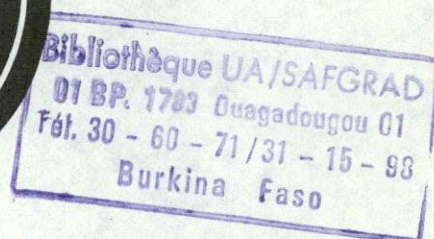


ORGANIZATION OF AFRICAN UNITY
SCIENTIFIC, TECHNICAL AND RESEARCH COMMISSION
(OAU/STRC)

**WEST AND CENTRAL AFRICA SAFGRAD
MAIZE COLLABORATIVE RESEARCH NETWORK**

633.1
SAF



**REPORT
OF THE EIGHTH MEETING
OF THE STEERING COMMITTEE**

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5 - 8 NOVEMBER, 1990
COTONOU, BENIN

MARCH, 1991



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

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1. INTRODUCTION

1.1. Joint Maize-Cowpea Opening Session

After registration, the members of the Maize Network Steering Committee attended a joint opening session for the Steering Committees of the Maize and the Cowpea Networks in the conference hall of INFOSEC, Cotonou, Benin Republic. The opening session was addressed by the Director of Agricultural Research, Benin Republic, a representative of the Deputy Director-General (International Cooperation Program) of IITA, and a representative of the International Coordinator of OAU/STRC-SAFGRAD.

1.1.1. Welcome address by the Director of Agricultural Research, Benin Republic

The Director of Agricultural Research of Benin Republic, Dr. Emile B. Assan, welcomed the participants to Benin Republic. He then stressed the importance of maize and cowpea in the Benin Republic. He indicated that pests, storage, and utilization are the major constraints to increased maize and cowpea production. He, therefore, urged participants to make serious efforts to alleviate these constraints. Dr. Assan expressed the wish to see more collaboration between IARCs and NARS. Finally, he wished the participants fruitful deliberations.

1.1.2. Address by the representative of the Office of the Deputy Director-General for International Cooperation, IITA.

Mr. E.F. Deganus welcomed participants on behalf of the Deputy Director-General for International Cooperation of IITA. He stated that the 8th meeting of the Steering Committees was being held at a time when the activities of both networks were approaching the completion date of the present phase of the Project. He indicated that IITA believed that the networks had done an excellent job and are now in a position to attain achievable goals and impact in the participating network member countries. He, therefore, advised the participants to make

deliberate efforts to identify the indicators of progress and to devise a format for reporting progress and impact. He emphasized that impact has become an important criterion for donor support, and, therefore, the matter needed to be addressed urgently. Mr. Deganus advised members of two Steering Committees to deliberate on the issue of extension of Phase II, i.e. or bridging the period between Phase II and Phase III. In response to the request by the Director of Agricultural Research of Benin Republic for more collaboration between the IARCs and NARS, Mr. Deganus indicated that under its Medium Term Plan, IITA has established various mechanisms for not only collaborating with NARS but also strengthening them so that the Institute can participate in the development of technologies relevant to the NARS.

1.1.3. Address on behalf of the International Coordinator of SAFGRAD

Dr. Taye Bezuneh, SAFGRAD Director of Research, addressed the session on behalf of the International Coordinator of SAFGRAD. He informed the participants that the SAFGRAD Networks' Strategic Plan has been submitted to donors by the SAFGRAD Coordination Office to solicit funds for continued activities of the networks. He also reported that OAU has taken the necessary steps to support SAFGRAD networks through the SCO, not only by providing legal and administrative framework for the management of the SAFGRAD project, but also by increasing its financial contribution to SCO. Furthermore, the OAU has scheduled a donors' conference for 1991.

1.2. Attendance

1.2.1. Members of the Steering Committee

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

<u>Name of members</u>	<u>Title</u>	<u>Address</u>
Dr. B. Badu Apraku	Maize Breeder	Crops Research Institute P.O. Box 3785 Kumasi, Ghana
Dr. Charles Thé	Maize Breeder	IRA/NCRE, B.P. 2067 Yaounde, Cameroon
Dr. Esseh-Yovo Mawule	Maize Breeder	DRA, B.P. 2318 Lomé, Togo
Mr. Abdou Ndiaye	Maize Breeder	ISRA, B.P. 240 CRA/Fleuve, Saint-Louis Sénégal
Mr. Romuald A. Dossou	Maize Breeder	SRCV d'Ina, B.P. 3 N'Dali, Benin
Mr. Koffi Attiey	Maize Breeder	01 B.P. 635, Bouake 01 Côte d'Ivoire
Dr. J.M. Fajemisin	Maize Network Coordinator	IITA/SAFGRAD 01 B.P. 1495 Ouagaadougou 01 Burkina Faso

1.2.2. Observers/resource persons

The following persons attended the meeting as observers/resource persons.

Dr. K.A. Elemo	Agronomist	IAR/ABU, PMB 1044 Zaria, Nigeria
Dr. M. D. Winslow	Director, Maize Research Program	Maize Research Program IITA, PMB 5320 Ibadan, Nigeria
Mr. E.F. Deganus	Administrator	International Cooperation IITA, PMB 5320 Ibadan, Nigeria
Dr. J.C. Sentz	Liaison Officer	USAID-IITA Liaison Officer, IITA, PMB 5320 Ibadan, Nigeria
Dr. S.T.O. Lagoke	Coordinator Pan-African <u>Striga</u> Control Network	IAR/ABU, PMB 1044, Zaria, Nigeria

1.2.3. Agenda for the meeting

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

- Adoption of the proceedings of the 7th Steering Committee meeting
- Mid-year report of the Network Coordinator
- Progress report on collaborative projects by Steering Committee members
- Report on visits by the Steering Committee members to national programs
- Report on 1990 Monitoring Tour
- Proposal for extension of SAFGRAD Phase II
- Plan for 1991 regional trials
- Joint maize-cowpea-sorghum seminar for research agronomists at IITA
- Proceedings for 1989 joint maize-cowpea workshop.

2. MID-YEAR REPORT OF MAIZE NETWORK COORDINATOR

The Network Coordinator, Dr. J.M. Fajemisin, presented his report under nine main headings, namely : regional maize trials, collaborative research, seed increase, funding, visits to national programs, monitoring tour, training, SAFGRAD-CORAF Maize Networks' harmonization, and planned activities for 1991.

2.1. Regional Maize Trials

Dr. Fajemisin indicated that two trials were prepared and despatched by the Network for the 1990 cropping season :

- (i) RUVT Early
- (ii) RUVT Extra-early

Following a decision at the 7th Steering Committee Meeting and the subsequent discussion with the IITA Maize Program, IITA ceased to coordinate trials of early maturing varieties. Similarly, all the late maturing varieties hitherto offered by SAFGRAD as RUVT 2 will subsequently be coordinated by the IITA Maize Program. This new rearrangement is necessary in order to avoid duplication of maize varieties being evaluated and, thus, to harness better the resources and time of national program scientists. Thirty-six and 28 sets of RUVT-Early and RUVT Extra-early, respectively, were sent to 16 countries in 1990.

2.2. Collaborative Research

The Network Coordinator indicated that the development of drought resistant/tolerant maize continued in Burkina Faso with the evaluation of full sib families of Pool 16 DR. Six sets of these materials were prepared as 13 x 13 lattice of 3 replications and forwarded to Benin, Cameroon, Ghana, Senegal and Burkina Faso (2 sets : Kamboinse and Farako-Bâ). Weather conditions were not very favourable in the sub-region during the season. The trials were evaluated under the prevailing drought at Kamboinse and Ghana.

2.3. Seed Increase

In order to secure seeds for the 1991 trials and to satisfy requests from national programs, seed multiplication of the entries of the regional trials was carried out at Kamboinse, Burkina Faso, under controlled conditions to maintain genetic purity.

2.4. Funding

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 1990 funds disbursement as at September 30, 1990 is presented in the table below.

Payment of first instalment of fund allocated to SAFGRAD
Maize Network member countries for the year 1990
(as at 30 September, 1990)

Country	Amount disbursed (CFA)	Date
Cameroon	412,000	30/6/90
Guinea	275,000	9/7/90
Burkina Faso	412,000	9/7/90
Benin	412,000	30/7/90
The Gambia	412,000	30/7/90
Central African Republic	275,000	30/7/90
Mali	412,000	30/7/90
Tchad	275,000	30/7/90
Ghana	412,000	30/7/90
Nigeria	\$1,500.00	30/7/90

2.5. Visits to National Programs

In order to monitor network activities and to promote interaction among NARS scientists, consultation visits were made to several countries by the Network Coordinator and some members of the Steering Committee. The Coordinator visited Guinea (10-17 July), The Gambia (18-22 July), Ghana (31 July to 4 August), Côte d'Ivoire (6-10 August), and Mali (21-25 August).

The major maize research stations in Guinea visited were Kilissi, Pita and Kankan. There was a clear improvement of field plot technique compared to what was observed in 1988. In Pita, Mr. Abdoulaye Sow, one of the Maize Research Network trainees,

was firmly in control of maize research activities. At Kankan, maize research activity was very low, contrary to the level of interest in maize cultivation in that region. As a follow-up of last year's consultation ^{to Gambia} on the development of a modest maize improvement program, Mr. Musa S. Mbenga, Agronomist/Breeder, was assisted in setting up (at Sapu) the half-sib improvement projects for the two widely cultivated maize cultivars : TZB-yellow and Jeka. Some on-farm trials were visited and it was interesting to note the great interest of the inhabitants of Sinchang Bajung village, where maize was more widely planted than any other crop.

The visit to Ghana was to discuss the setting up of streak screening facilities to which the Network has this year made some financial contribution. There was a protracted drought which affected the trials adversely. However, the drought might turn out to be helpful in selecting drought tolerant families at Tamale within the Pool 16 DR IPTT.

Trials visited in Côte d'Ivoire included : RUVT-Early, RUVT-Extra-early, top cross evaluation, diallels involving yellow-grained cultivars, and evaluation and seed increase of ecotypes. Useful discussion ^{was held} with Dr. Moyal, an out-going expatriate entomologist, on his findings on stem borers.

The trip to Mali involved visits to all the major maize research or testing stations in the south and center of the country namely : Sougoula, Kaboïla, Sotuba, Mansatolla and Katibougou. Streak infection was very high in Kaboïla ; infection level was up to 55 % on susceptible entries in a special trial of resistant and susceptible varieties planted there. The extra-early varieties showed clear advantages, particularly in Mansatolla and in Kabitougou, where there were 19 days of drought and the plants were flowering in 42 days with a cumulative rainfall of 360 mm.

2.6. Monitoring Tour

The Coordinator indicated that the Maize Monitoring Tour to Cameroon and Nigeria was successfully undertaken from 8 to 22 September, 1990. The participants included scientists from selected network member-countries and resource persons from IITA and SAFGRAD.

He pointed out that the back-up support of IITA to NARS in the area of developing disease-resistant germplasm and on the integrated approach to Striga control was clearly evident during the trip. He hoped that in no distant future, the technique for Striga control would be in a form that can be extended to NARS, just as the streak resistance technology. He observed that other areas of research emphasis at IITA that are of interest to the Network are stem borer resistance, storage pests control, the development of drought resistant/tolerant germplasm, and evaluation of maize germplasm for nitrogen use efficiency.

2.7. Training

Members were informed that the third annual, 5-month training of maize technicians started on 18 June 1990 in Kamboinse, Burkina Faso, with the following participants from six countries.

<u>Name of participant</u>	<u>Country</u>
Denagnon Gangbo	Benin
Raymond Noba	Burkina Faso
Jean Faikreo	Cameroon
Abdoulaye Bojang	The Gambia
Mahamadou D. Maïga	Mali
Kossi Attiley	Togo

The course concentrates on : management of field experiments, varietal maintenance, seed multiplication, data recording, statistical analysis, data interpretation, and report writing. The course is practical-oriented with projects assigned to individual participants, and is backed up with lectures from practising resources persons. Working visits were conducted to outstations at planting, during crop growth, and at harvesting, to emphasize the importance of multi-locational field experimentation. The course was scheduled to end on November 23, 1990.

2.8. SAFGRAD-CORAF Networks' Harmonization

Dr. Fajemisin reported that a meeting of the Harmonization Committee for the activities of the Maize Networks coordinated by SAFGRAD and CORAF was held at Ouagadougou, Burkina Faso, May 7-8, 1990. The following persons participated :

(a) Committee members

<u>Name</u>	<u>Position/affiliation</u>
1. J.A. Ayuk-Takem	Coordinator, CORAF Maize Network
2. J.M. Fajemisin	Coordinator, SAFGRAD Maize Network
3. Angonga Letsaka	CORAF Maize Network Representative
4. Chabi G. Yallou	CORAF Maize Network Representative
5. Attiey Koffi	CORAF Maize Network Representative
6. Charles Thé	SAFGRAD Maize Network Representative
7. B. Badu-Apraku	SAFGRAD Maize Network Representative

(b) Observers

8. J.M. Menyonga	SAFGRAD International Coordinator
9. J.P. Ekebil	IITA Deputy Director General
10. J.C. Sentz	USAID-IITA Liaison Officer
11. Taye Bezuneh	SAFGRAD Director of Research
12. G. Konate	Virologist, INERA, Burkina Faso

The Committee reviewed the areas of emphasis of each Network in relation to the major constraints to maize production in West and Central Africa. There was discussion on the mode of approach and the calendar of major events (meetings, workshops, monitoring tours, etc.) of each network in order to avoid duplication and conflict.

Recognizing the problems posed by the existence of the CORAF and SAFGRAD Networks within the same sub-region, the members of the Harmonization Committee recommended that the two networks should be merged to form one network, with one Steering Committee, within the next two years. It was recommended that the executive bodies of the respective networks should meet as soon as possible to explore ways of implementing the above recommendation.

2.9. Planned Activities

The activities planned through March 1991 are as follows :

- (i) Joint Maize-Cowpea-Sorghum networks' seminar for NARS research agronomists to be held at IITA, Ibadan, 7-21 January 1991.
- (ii) Joint Maize-Cowpea-Sorghum networks' workshop scheduled for Niamey, Niger, 8-14 March, 1991.

2.10. Discussion of Network Coordinator's Report

(i) The Network Coordinator was asked to explain why Drs. Esseh-Yovo and Elemo did not visit the national programs of Guinea and Cape Verde, respectively. The Network Coordinator indicated that Dr. Esseh-Yovo did not make the trip to Guinea because in his (the Coordinator's) earlier visit in July he found that the country was facing acute transportation problems which would make Dr. Esseh-Yovo's visit logistically very difficult. In addition, SAFGRAD trials sent to Guinea were not planted and there was little to see based on the Coordinator's earlier visit. With respect to Dr. Elemo's proposed visit to Cape Verde, the Network Coordinator said that over the past one year Cape Verde had not shown sufficient interest in the Network to justify such a visit. For example, there were no responses to the invitations extended to Cape Verde to send candidates for the technical training at Kamboinse in 1989 and 1990.

(ii) Dr. Fajemisin was requested to explain the differences between tolerance and resistance ratings to the maize, streak virus. He explained that with resistance, even though the streak virus disease symptoms could be visible, in both resistant and susceptible cultivars, the severity of the disease should be significantly lower in the resistant than in the susceptible cultivar. With tolerance, two varieties could have the same severity of disease but the yield of the tolerant variety should be higher, than that of the susceptible variety.

3. PROGRESS REPORT ON 1990 COLLABORATIVE PROJECTS

3.1. Report by IITA Maize Program Director

Dr. M.D. Winslow, Director, IITA Maize Research Program, reviewed the focus areas of IITA's Maize Research Program as delineated by its strategic review and medium-term plan. Its highest-priority environment is the moist savanna, and the highest priority research topic is Striga. The Maize Research Program works on two aspects : (i) resistance breeding and (ii) pathosystem analysis (pest biology/ecology). Related work on cropping systems is done in the savanna systems working group (Dr. G. Weber was recently transferred to the group, as an agronomist) and forest systems working group (led by Dr. H. Mutsaers) both in IITA's Resource and Crop Management Program (RCMP).

Dr. Winslow then asked the group to provide him with feedback on the following issues he raised in relation to IITA backstopping of the network.

(i) Would the Network like IITA to replace the present 12-week, general training course on Maize Research and Technology Transfer with three annual, small workshops on specific research methodologies (e.g., the recent workshop on Striga Research Methodology for maize Striga) since resources are too limited to carry out both types of training each year ?

(ii) How do members view the existing arrangement for international trials whereby some trials are supplied by IITA and others by SAFGRAD ? Any suggestions on numbers of trials, etc ?

(iii) What are members' views on standardization of technology and rating scales ? Should these be agenda items for the SAFGRAD workshop next year ?

Finally, Dr. Winslow urged all members to collect Striga seeds from their Striga-infested areas, in preparation for artificial field infestation in 1991. IITA scientists and NARS scientists from four countries have just conducted a workshop on Striga. The Workshop is producing a methodology hand-book which will be distributed before next planting season so that the techniques will be widely used in various countries.

A series of questions from the Committee members followed Dr. Winslow's presentation.

(i) When asked about recent staff changes in IITA's Maize Program, Dr. Winslow informed the Committee that Dr. Kling will replace Dr. Mareck at the end of January, 1991. Also, Dr. Everett will come to IITA as a visiting scientist, for one year, beginning January 1, 1990, while Prof. Okonkwo of the University of Nigeria, Nsukka, will be in IITA for six months, beginning January 1, 1990, to contribute physiology research expertise on the Striga problems.

(ii) A question was raised as to the procedure IITA uses to recruit its core staff scientists and visiting collaborative research scientists (NARS scientists placed at IITA to strengthen collaborative research). The reply was that, for core scientists, an effort is made to recruit the best person available globally ; while for visiting collaborative research scientists, the decision is made at the discretion of IITA's Maize Research Program core scientists. Several committee members expressed concern that core position vacancies had not been advertised widely in the past ; The Committee also felt that a candidate's capability for effective working relationship with NARS scientists should be an important criterion in hiring.

(iii) Dr. Fajemisin asked Dr. Winslow to describe the new system of "Linkpersons" assigned to link IITA maize researchers to NARS. Dr. Winslow explained that, since the Maize Program Liaison Scientist, Dr. Weber, has been transferred to RCMP, it became necessary to re-apportion the liaison duties among the remaining scientists. The Maize Program has decided on a priority ranking of countries of West and Central Africa, according to the importance of maize in each country. The countries with highest priority rankings were then assigned to core Maize Program scientists, while those with lower ratings were assigned to International Cooperation Program Liaison Scientists, who are responsible for other crops. The specific assignments are as follows.

Benin
Togo
Senegal

}

Dr. N. Bosque-Perez

Congo
Equatorial Guinea
Gabon
Central Afr. Rep.

}

IITA International Cooperation Program
(ICP)

Burkina Faso
Mali
Niger
SAFGRAD

}

Dr. J.M. Fajemisin

Chad	}	ICP Francophone Liaison Scientist
Guinea		
Guinea Bissau		
Mauritania		
Cameroon	}	Dr. S.K. Kim
Nigeria		
Ghana		Dr. J.L. Kling
Zaire		Dr. K.F. Cardwell
Gambia	}	Dr. Suh (ICP Anglophone Liaison Scientist)
Liberia		
Sierra Leone		
Côte d'Ivoire		Dr. M.D. Winslow

Dr. Winslow explained that the link person is not meant to block direct access of NARS scientists to the whole range of IITA resource persons ; rather, link persons should help facilitate such communication. When NARS scientists have a problem but do not know whom to approach at IITA, they should contact the relevant link person who will put them in touch with the most appropriate resource person ; they could subsequently, contact him/her directly, but they should preferably copy all correspondence to the link person. The link persons are expected to visit their countries to familiarize themselves with all aspects of their maize systems, thereby becoming knowledgeable about their needs and constraints.

(iv) Dr. Winslow was asked whether there are any changes in the breeding strategies and approaches at IITA. He replied that none had yet been considered, but solicited advice/suggestions from committees members. IITA would like NARS and seed companies to take over as much of the "finished product" development as possible, i.e. hybrid varieties and OP's adapted to specific local ecosystems, so that IITA could put more resources into long-range development of base populations for the comprehensive breeding system. He asked for NARS advice on the extent to which IITA could turn over finished product responsibilities to them. SAFGRAD in particular provides a mechanism for pooling NARS strengths needed in producing such materials.

(v) A question was asked as to what extent NARS can influence IITA strategy. Dr. Winslow replied that NARS scientists were included in IITA's strategic planning panels. Mr. Deganus added that strategic planning is meant to be flexible, and NARS input is valued at all times, even after the strategic plan has been completed.

(vi) In relation to (v) above, Dr. Winslow was asked to indicate the extent to which IITA's resources could be committed to maize research in the Sudan savanna zone. Dr. Winslow replied that, although this is an important maize zone, a desire to focus IITA's limited resources on the ecosystem of highest potential payoff had led the strategic review to give top priority to the moist savanna. Although yields are often higher in the Sudan savanna zone (due to higher insolation, less diseases and better soils) this was a risky zone for maize due to unpredictable drought. He commended the excellent progress of SAFGRAD in developing early and extra-early maturing maize which helps reduce this risk and stabilize production.

(vii) Dr. Winslow was asked when he expects IITA to develop stem borer resistant materials for testing by SAFGRAD. He replied that, up till now, high levels of resistance had not been found. IITA is, therefore, looking at biotechnology for some promising new approaches in this area. However, this is a long-term strategy, and it is not possible to say when the payoff will be realized. Meanwhile, the conventional breeding method should be seen as "maintenance breeding", in the sense that newly produced varieties are no more susceptible than the existing varieties. The screening techniques being developed will be useful on materials coming out of the biotechnology work, since they will need to be verified in the field.

(viii) What is IITA doing in the areas of utilization of maize grain for different purposes and QPM (quality protein maize)? Dr. Winslow explained that until now, little work has been done in this very important area. Dr Kling spends a part of her time on identifying the specific characters of maize grain that are associated with quality in West and Central Africa. IITA's strategic plan indicates that 5% of its research resources should go into post-harvest and utilization research across crops. At present, however, funds are limiting to implement the project. On the subject of QPM, he said that limited work has been done on converting QPM populations to streak resistance but there is concern about the poor storage ability of QPM grain.

Related to this, Dr. Winslow explained IITA's strategy for improving resistance to storage insects. There are three resistance barriers. The husk is the first barrier, and IITA is selecting for longer and more tightly packed husk leaves in all populations. The second barrier is physical resistance of the grain to penetration by weevils, in the form of tougher outside layer and tighter packing of grains on the cob. The third line of resistance is the postulated existence of anti-nutritional factors in the grain which could inhibit insect growth/development. IITA is seeking help of ODNRI on the latter two barriers. Dr. Kossou, visiting collaborative scientist from the Republic of Benin, is playing a central role in this work, together with Drs. Bosque-Perez and Dr. Mareck.

3.1.1. Response to Questions posed to members of the Steering Committee by Dr. Winslow.

The members of the Steering Committee responded to the questions posed by Dr. Winslow as follows :

(i) Training issue. There were two opposing viewpoints on the long term training course. Several committee members felt strongly that it was so theoretical that trainees on their return apply very small proportion of what they were taught, (e.g., statistics, physiology, etc). Some other committee members, however, felt there was a need for this type of theoretical teaching, because their staff need such a refresher course, having left school for many years. One participant was of the opinion that this sort of general training, especially technician-level training, should be given by national institutions, like universities and colleges. In the end, there was general consensus that classroom work should occupy no more than 30% of the course ; also the course could be biennial rather than annual.

All participants felt that short, intensive, topic-specific training courses were very valuable and should be continued. As many as three per year might be offered, in years when there was no long-term course.

Another type of training, considered by all to be quite valuable, is that in which trainees are "attached" to particular scientists for variable periods of time to learn on-the-job. This "internship", or "apprenticeship", type training should continue.

(ii) International trials. The participants felt that the present system of international trials is generally satisfactory. There was a wish that more specific information be provided for the materials that are accepted as entries, e.g. years of previous testing. Yield trials should contain 10-15 entries. National programs would like to be able to request only for those entries they had not evaluated before, in respect of trials that include many other entries that are not new to such programs.

On whether or not entries into regional trials should have resistance to maize streak virus (MSV), the majority of Committee members felt strongly that MSV resistance should be a prerequisite.

(iii) Standardization of terminology. On the question of standardization of terminology and rating scales, it was recommended that this issue be put on the agenda for the 1991 Joint Maize-Cowpea-Sorghum workshop to be held in Niamey, 8-14 March, 1991.

(iv) To what extent could IITA pull back from the development of the roughly-tested, "finished product" varieties? It was agreed that such a pullback would enable IITA to put more resources into studies of basic methodologies and base population development. This question arose because of the excellent achievements by SAFGRAD in strengthening of NARS breeding programs and in diffusion of finished varieties among all of the NARS. The consensus was that IITA could indeed concentrate on base populations and methodology, leaving "finished product development" for NARS. For example, hybrid breeding should concentrate on developing and characterizing materials into heterotic groupings, and developing inbred lines to S7 level. It is not necessary for IITA to test actual hybrid combinations for varietal identifications since NARS can now do this successfully. IITA should establish the testers against which the heterotic groupings are defined. Development of such heterotic groups will be of immense long-term benefit to the region.

3.2. Report on Activities in Ghana by Dr. Badu-Apraku

The major activities carried out in 1989 by the national maize program of Ghana, as a Lead Center responsible for generating maize varieties of different maturity groups for the network, were presented under the following headings:

- (i) population improvement,
- (ii) replacement of selected streak susceptible varieties with streak resistant versions,
- (iii) hybrid development,
- (iv) variety testing, and
- (v) seed production.

3.2.1. Population improvement

(i) Improvement of the 105-day white dent, 90-day white dent and 120-day yellow flint/dent populations. In an effort to improve the 105-day and 90-day white dent populations, full-sib families have been generated for progeny trials in 1991. Also, full-sib families selected from the 120-day yellow population, based on progeny trials conducted in 1990, have been recombined in an attempt to improve the population.

(ii) Improvement of EV 8444 BC4 for earliness and husk cover. EV 8444 SR BC4 is a promising medium maturing, streak resistant variety but it has poor husk and the maturity is later than desirable. The two undesirable characters are being improved through selfing and recombination in full-sib families. During the major season, reciprocal full-sib families were generated for progeny evaluation.

(iii) Improvement of nitrogen use efficiency in the 120-day white dent population. There is a need for maize varieties which utilize nitrogen fertilizers more efficiently so that the amount of fertilizer currently recommended for maize could be cut down, without productivity being seriously affected. This is very important in view of the high fertilizer prices resulting from the removal of subsidies on fertilizer by the government.

A program was therefore initiated during the major season to improve the nitrogen use efficiency of the 120-day white dent population. To this end, full-sib families have been generated in the 120 DWD population for evaluation under low and high nitrogen levels in 1991.

3.2.2. Replacement of the streak susceptible varieties, Aburotia and SAFIFA-2, with streak resistant versions

Since 1986, a major effort of the maize breeding program has been devoted to the replacement of all released streak susceptible varieties with streak resistant versions.

Dorke, an early, white dent variety was extracted in Ghana from Pool 16 SR in 1987. The results of streak resistance level evaluations carried out in IITA in 1988 revealed that Dorke had moderate level (53%) of streak resistance. There was therefore a need to upgrade the level of streak resistance before it could be released to replace SAFITA-2. Steps were initiated at IITA in 1989 to upgrade the level of streak resistance in Dorke. Results of streak resistance evaluation carried out in IITA, Ibadan, during the 1990 major season, revealed that the level of streak resistance in Dorke SR had been upgraded from 51.4 to 95%. Dorke SR is currently being tested on-station and on-farm in Ghana and it is earmarked for release at the beginning of the 1991 major season.

Abeleehi is an intermediate white dent, streak resistant variety extracted in 1988 from two related materials, Ikenne 8149 SR BC2 and Ikenne 8149 SR BC5. Abeleehi is superior to the currently recommended variety Aburotia in terms of yield, plant height and streak resistance. Streak resistance level evaluation carried out in IITA, Ibadan, in 1989 and 1990 revealed the streak reaction in Abeleehi to be at resistant level. The variety has, therefore, been proposed to the varietal release committee for release. Depending on the decisions of the varietal release committee, Abeleehi might be released at the beginning of the major season of 1991.

3.2.3. Hybrid development

(i) Testing in hybrid combinations of 43 tropically adapted Ghana inbred lines. In 1986, inbred line development was initiated in an elite population, Ejura 7843. In addition, selection and inbreeding was continued in 84 and 10 segregating lines (S3) of Tuxpeno background received from IITA and CIMMYT, respectively. By 1988, tropically adapted homozygous inbred lines (S6 and S7) had been received from Ejura 7843 (24 inbreds) and CIMMYT (four inbreds). Results of ear and stalk rot, maize streak virus, and stem borer (*Eldana saccharina*) evaluations carried out in IITA in 1989/1990 have revealed that some of the

Ghana inbreds have good levels of resistance and could be utilized in developing resistant hybrids and synthetic varieties. Testing in hybrid combinations of the 43 tropically adapted Ghana inbreds was initiated at 3-5 representative locations in Ghana (Ejura, Kwadaso, Kpeve, Damongo and Nyankpala) during the major season. Selected inbred lines from IITA were used as testers; preliminary results so far have revealed some of the hybrids as promising.

These promising hybrids would be included in the on-station variety trials in 1991 for further evaluation. Also, based on the results of the combining ability studies, the Ghana inbreds would be placed in different heterotic groups.

(ii) Inbred line development in Composite W, Giant Composite, EV 8444 SR and the 120-day white dent pool. The S4 inbreds from Composite W and Giant Composite have been advanced to the S5 stage. The S5 lines from the two sources would be advanced to the S6 stage during the minor season. S3 lines from EV 8444 SR BC4 have been advanced to the S4 stage and have been topcrossed to two testers (Ejura 7843 and EV 8444 SR BC4). Inbred line extraction was initiated in the 120-day white dent pool during the major season. The S1 lines are being advanced to the S2 stage during 1990 minor season.

(iii) Development of 120 DWD male and female populations for hybrid development. A major goal of the maize breeding program is to develop two heterotic populations for hybrid development. Based on yield potential, the 120-day white dent population which is of Tuxpeno background has been identified as the female parent. Development of a male population, with good heterosis in crosses with the female population, was initiated in 1989. Based on the results of combining ability studies, TZB-SR, EV 8444 SR BC4, and CIMMYT Population 42 were composited in 1989 to form the male population. During the major season of 1990, the male

population was taken through the second cycle of recombination. Steps are currently being taken to incorporate Suwan 1 (white version) into the male population and CIMMYT Populations 21 and 49 into the female population.

3.2.4. Variety trials

Three types of station variety trials (120-day, 105-day, and 90-day materials) were each conducted at 4-6 locations during the major season. The 105-day and 90-day variety trials have been planted in the minor season at 4 locations. In addition, combining ability tests involving the Ghana inbreds and some selected IITA inbreds lines, as well as trials received from IITA, CIMMYT and SAFGRAD were conducted. The field data are being analyzed.

3.2.5. Breeder's seed production

Breeder's seed fields of all commercial varieties, as well as the new varieties namely Abeleehi, Dorke SR and GH 8363 SR (quality protein maize) were established. From the hectareage established, it is anticipated that adequate quantities of breeder's seed of each variety would be produced in 1990.

3.3. Report on Activities in Cameroon by Dr. Charles Thé

3.3.1. Breeding for early maturity

The following activities were carried out in 1990 :

- (i) National early variety trial,
- (ii) Varietal development,
- (iii) Varietal crosses evaluations
- (iv) On-farm trial and "Maïs de case"
- (v) Breeder seed and Foundation seed production.

(i) National early variety trial (N.V.T. (E/I))

The trial comprised 15 entries tested in over 7 locations in the savanna zone. The objective was to identify high yielding and stable early maize that could be released to farmers.

(ii) Varietal development

Two sets of testcrosses of S3 lines extracted from a cross of CMS 8503 x DMR ESR-W, were evaluated at 3 locations.

The first set (named E₁) was chosen out of the early fraction and comprised crosses with 1368, 9071, 5012, and the population itself. The second set, with 90 entries, was selected within the intermediate fraction of the inbred lines and comprised testcrosses with the same testers.

In addition to the evaluation of the 2 sets of testers, inbred lines used to make the testcrosses, were recombined to make 2 synthetic varieties. E₁ and E₂, which were advanced to F₂.

(iii) Varietal cross evaluation

Partial diallel were made with following varieties :

- Maka,
- Blanc-2 precoce,
- CSP,
- Jaune Flint de Saria,
- Tuxpeno drought,
- KU 1414 SR,
- NCRE line 37, and
- 9848.

The F₁ from the crosses were evaluated at 2 locations : Soucoundou and Maroua. Two-row plots, 5-m long with 3 replications, were used. Heterotic pools will be made and, in addition, those crosses showing good specific combining ability will be advanced to F₃ and tested as a variety.

(iv) On-farm trials and "maïs de case"

On-farm trials using Pool 16 DR and, CMS 8806 (DMR ESR-Y) were carried out with 20 farmers. In addition, 500 grams of seed of CMS 8806 and CMS 8704 were given to 50 farmers to grow around their houses, as green maize for the "hunger period".

(v) Breeder seed and foundation seed production

Breeder seed and foundation seed productions of CMS 8806, TZEY-Y and Pool 16 DR were carried out in half-sib blocks.

3.3.2. Breeding for Striga tolerance(i) Inbred line evaluation

Five sets of inbred lines were evaluated in 1990 under artificial Striga infestation. Each set was made of 38 inbred lines tested in 1-row plot, 3 m long, and of 3 replications. Ratings on the scale of 1 to 9 and 1 to 5 were done 10 weeks and 12 weeks after planting by Drs. Kim and Thé, respectively. All inbreds tested, except one set (from IITA), originated from the IRA program.

(ii) Varietal evaluation

One set of the Striga observation trial from IITA was tested under artificial Striga infestation. The trial comprised 5 open pollinated varieties and 3 hybrids.

(iii) Agronomy trial for Striga control

The following trials were conducted in a Striga sick plot.

- (a) Evaluation of the effect of intercropping on Striga control.
- (b) Effect of various levels of N on Striga emergence.
- (c) Effect of trap crops on Striga emergence.
- (d) Effect of tillage on Striga control.

3.3.3. Breeding for drought resistance

(i) IPTT Pool 16 DR

One hundred and sixty-nine full-sib families generated in Pool 16 DR were tested at Maroua. The experimental design was a 13 x 3 lattice design with 3 replications. Visual selections were made by participants of the SAFGRAD monitoring tour.

(ii) Drought resistant composite

Ninety S₃ lines from the NCRE drought resistant pool were tested at 2 locations under 2 moisture regimes : Tied ridges and simple ridges. Families were selected for the development of a synthetic, drought resistant composite.

3.3.4. Agronomy research

The following trials were carried out by the NCRE Agronomy team :

- (i) Minimum tillage vs conventional tillage
- (ii) Residual effects of leguminous crop on maize yield
- (iii) Effect of mulching using cotton cake and brewery byproduct on maize yield
- (iv) Seed treatment effect on maize density
- (v) Graded-step technology embracing : soil preparation methods, seed, treatment, variety and fertilization
- (vi) Effect of plant density and timing of fertilization on extra-early maize.

3.4. Report on Activities in Togo by Dr. Esseh-Yovo Mawule

3.4.1. Screening for MSV resistance

The objective of the Togo program is to develop high yielding, streak resistant varieties which combine good husk cover and soft endosperm with prolificacy at low plant density.

(a). Methodology

(i) Mass rearing of Cicadulina. Mass rearing of Cicadulina mbila) is done on millet plants. Each insect rearing cage has a capacity of 1.5 m³. Enough insects to artificially infest 10,000 plants are reared per week in the cages which have the potential of producing enough insects to infest 20,000 plants per week.

(ii) Artificial infestation. Maize plants are raised in pots. Two days after germination, the pots are placed in cages containing viruliferous insects for 48 hours before young maize seedlings are transplanted in the field.

(iii) Selection method. Crosses are made between susceptible varieties and the SR donor source variety. The F1 plants are artificially infested; later the selected ones are selfed. At S3 or S4 stage, selected lines are recombined. At present, two populations are under study : AB12 and AB13.

(b). Results

One hundred and fifty-two families of AB12 were recombined at S4. Improvement of AB13 is in progress.

3.4.2. Level of resistance study

Three varieties, namely Tzi3 (1368), CVR3 (Revolution) and CVR3 x Tiemantié were tested for their levels of resistance to MSV using the Togo method. Rating for MSV on the scale of 1 to 5 was done three times at 21-day interval, with the following results:

- Tzi3 scored 4.4, 3.9 and 3.9 at the first, second and third ratings, respectively;
- CVR3 scored 3.8, 3.2 and 3.1 at the first, second and third ratings, respectively; and
- The CVR3 x Tiemantié scored 3.8, 2.6 and 2.0 at the three ratings, respectively.

3.5. Report on Activities in Nigeria by Dr. K.A. Elemo

As a Lead Center, Nigeria has responsibility for agronomy research. During 1990, the collaborative trials were established at Minjibir (Kano State), Gusau (Sokoto State), both in the Sudan savanna agroecological zone, and at Maigana (Kaduna State) in the northern Guinea savanna. The last site was selected because of its hydromorphic soils. (It was reported at the seventh Steering Committee meeting that yields of about 7 t/ha were obtained from similar soils in the Cameroon and Burkina Faso.)

3.5.1. Hybrid maize variety trial

Eight hybrid maize varieties were tested, with open pollinated TZBSR as the check, in a randomized block design with four replications. The objective was to identify the most adapted hybrid variety for the northern Guinea and Sudan savanna zones. This trial was sited at two of the above locations (Gusau and Maigana) as well as Samaru in the northern Guinea savanna. The trial at Gusau was abandoned because of acute transportation problems, but those at Samaru and Maigana were successfully executed with and reliable results were expected.

3.5.2. Response of extra-early and early maturing maize to rate and time of N. application

This trial was established at Maigana, Minjibir and Gusau. An early maize variety, TZESR-W, and an extra-early maize variety, TZEY-Y, were established at five N levels (0, 40, 80, 120 and 160 kg N/ha) applied at three different times (all at planting ; half at planting followed by half after 14 days ; and half at planting followed by half after 28 days). The trial at Gusau had to be abandoned because of transportation problems, but reliable results were expected from the other sites.

3.5.3. Response of extra-early and early maturing maize varieties to plant density

This trial was established only at Gusau but had to be abandoned because of lack of transportation.

3.5.4. Regional trials

Three sets of 1990 RUVT extra-early and early were received; each set was planted at Minjibir, Maigana and Gusau. At Minjibir, the trials were doing well except that RUVT early was inadvertently planted on a field with localized soil problems. Harvesting was in progress. Reliable results were being expected from the trials at Maigana; again the trials at Gusau had to be abandoned because of transportation problems.

3.5.5. Other research activities

During the year, agronomic research activities were increased. These have been partly stimulated by the desire of agricultural development projects in the mandate area to have technologies appropriate for the small-scale farmer.

(i) Maize/rice mixture

Four rice varieties (ITA 257, ITA250, ITA 301 and a local) were tested with two maize cultivars (TZESR-W and TZBSR) at three crop proportions. The factorial experiment was laid out at Samaru in a randomized block design with three replications.

(ii) Maize/sorghum mixture

Previous studies have shown that the yield advantage from maize/sorghum mixture was contributed principally by the sorghum component. In order to improve on the productivity, a trial was conducted at Samaru to enhance maize yields by optimizing the N uptake. The components were established at their full sole crop populations or at half of these. The sole crops were also planted. Five levels of N (0, 40, 80, 120 and 160 kg N/ha) were studied.

(iii) Maize/groundnut mixture

At Samaru, two maize varieties (TZESR-W and TZB-SR) were tested with two groundnut cultivars (RRB and RMP 12) in alternate single rows, alternate double rows, and mixing within rows, in a randomized complete block design with four replications.

(iv) Maize/cowpea mixture

Maize in mixture with cowpea was established and given in different combinations of N (0, 75, 150 and 225 kg N/ha) and P (0, 40 and 80 kg P₂O₅/ha) to establish the optimum fertilizer requirement for the mixture. The trial was planted at Samaru.

(v) Fertilization of hybrid maize

A trial was conducted at Samaru to establish the optimum fertilizer requirement of hybrid maize. The test crop was hybrid variety 8505-2. The fertilizer treatments involved different combinations of N, P₂O₅ and K₂O in a randomized complete block design.

(vi) Other studies

- (a) Striga monitoring studies were conducted in farmers fields in five villages, in collaboration with the savanna working group of IITA. Host maturity period was found to be more correlated with grain yield than the number of emerged Striga plants.
- (b) On-farm adaptive research was conducted with farmers in Daudana village to compare the performance and profitability of open pollinated and hybrid maize varieties.
- (c) Agronomic studies were also conducted on effects of Leucaena (at source) and micronutrients on maize.

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

4.1. Report on Visit of Dr. Charles Thé to Benin Republic

Dr. Charles Thé (Cameroon) visited the Benin program from September 21 to 25, 1990. He was accompanied by Mr. Yallou Chabi, the Benin Maize Coordinator.

He was introduced to Dr. Assan Emile, the Benin Director of Agronomic Research (DRA). Dr. Charles Thé briefly introduced himself to Dr. Assan and stated the objective of his visit. (Dr. Assan had earlier that very morning received the letter from the SAFGRAD Maize Coordinator, announcing his visit.)

4.1.1. Visit to INA Station

INA station (358 m above the sea level) has a mean annual rainfall of 1,180 mm. Average minimum temperature and maximum temperatures are 21.3 and 36.2°C, respectively.

The station comprises :

- 4 antennae for "recherche thematique"
- 3 antennae for cropping system research.

Twelve trials were visited at INA. The promising entries of each trial are presented in Table 1.

Table 1. Promising entries of trials at INA Station (Benin).

Name of trial	Promising entries	Remarks
IPTT Pool 16	Entries in the Following plot nos. in replicate 2 were promising. 2002, 2011, 2048, 2051 2086, 2094, 2103, 2115, 2119, 2128, 2142, 2166	(i) No border row for the 1-row plots (ii) Fertilization not adequate
RUVT Early	- TZE Composite 3 x 4 - Across 86 Pool 16 SR - EV 8731 SR BC6 - DMR ESR-Y	Low density
EVT ISR	TZUT SGY 8749 SR	
International white hybrid	- 8516-12 - 8321-18 - 8321-21 - 8705-4	
Streak observational inbred lines	- Tzmi 502 - KU 1414 - 1368	Some line contamination
E.V.T. LSR	- CMS 8710 - EV 8443 DMR-SR - TZB SR	
ENA-VAT (National Trial, Late)	- TZB SR - EV 8443-SR	8 m-row, 4 reps.
ENA-VAP (National Trial, Early)	- Across 86 Pool 16 DR - DMR ESR-Y - DMR ESR-W	
Diallel evaluation (Early set)	- DMR ESR-W x Across 86 Pool 16 DR - TZESR-W x Across 86 Pool 16 DR	
Diallel evaluation : (Late set)	TZBSR x Local	No obvious heterosis expression
CORAF Trials	- Ikenne (1) 8149 SR	
Seed multiplication	11 varieties	
30 Inbred lines maintenance	1201, 9071, 1368, 9450, 9485.	Drought at pollination

Observations and recommendations

The Station was very well managed. Trials were generally in good condition, although there is need to control erosion. Careful selection of materials (parents) for diallels should be done. There was no heterosis effect among all the crosses observed. Apparently, all the varieties involved in the diallel belong to the same heterotic group, except TZB-SR and the local material.

From the Pool being created by recombination among the parents involved in the diallel, it is suggested that the Composite to be formed should be called gene Pool 1. From here, experimental varieties could be extracted by running full-sib or Sz recurrent selection type of IPTT. The technician, Mr. Mohamed Soumanou, is to be commended for his good work.

4.1.2 Visit to Bagou Station

Dr. Thé visited four trials at the Bagou Station with an average annual rainfall of 1000 mm. The trials and the promising entries are shown in Table 2.

Table 2. Promising entries of trials at Bagou Station (Benin)

Name of trial	Promising entries	Remarks
ENA VAT	TZPB SR Okomasa EV 8422 SR	
ENA VAP	DMR ESR-W Across 86 Pool 16 DR	
RUVT-1	DMR ESR-Y DMR ESR-W Across 86 Pool 16 DR Across 88 Pool 16 DR Farako-Bâ 88 Pool 16 DR HD	DR Composite early was not promising; it should be rejected
International white hybrid	8705-4 8321-18 8316-12 8321-21	

Comments and recommendations

Fertilization on the trials was not adequate. In addition, the fertilizer was not uniformly applied. It is suggested that the method of application should be reviewed; also erosion should be better controlled. Striga damage was not as severe as expected. The technician in charge Mr. Agonse Guy is a conscientious and hardworking officer.

4.1.3. Visit to Tchaourou

At Tchaourou, the three 3 trials were all devastated by stem borers. Visual estimation of the losses due to stem borers was 85 to 90%. The trials visited were :

- (i) ENA VAT,
- (ii) EVT LSR, and
- (iv) International white hybrid trial.

The 3 trials were rated on a scale of 1 to 5 for borer damage ; the following conclusions could be made.

(i) In the ENA VAT trial, the following three TZSR-W experimental varieties sustained the least damaged by stem borer: Farako-Bâ TZSR-W (2.5), Sekou 81 TZSR-W (2.5), and Sekou 85 TZSR-W (2.2). The most damaged entries were : EV 8443 SR (4.3), Okomasa (4.5), and EV 8422 SR (4.5).

(ii) In the EVT LSR trial, the best entries were Across 85 TZSR-W (3.0), TZB SR (3.0), and EV 7722 SR (3.0), The worst entries being Okomasa (4.5), 8321-18 (4.0), and Gandajika 8422 SR (4.2).

(iii) In the international white hybrid trial, the least damaged entries were : Ikenne TZSR-W-1 (3.0), TZBSR (3.0), 8321-18 (2.7), and 8421-21 (2.5); the most damaged entry was 8705-5 (3.6).

Comments

Except for borer damage, the trials at this site were very well managed. By the time of the visit, the technician, (Mr. Saka Kora) had rated all entries for borer damage and his scores were found to be similar to those of Dr. Thé and Yallou. Apparently, Tuxpeno materials appeared to be more susceptible to borer damage while all TZSR-W derived varieties showed some tolerance to borers.

4.2. Visit of Dr. B. Badu-Apraku to the National Maize Program of Togo

Dr. Badu-Apraku (Ghana) visited the national maize program of Togo from 21-25 August, 1990. The main objective of the visit was to enable him to study the streak screening facilities and appraise it, with the view to setting up similar facilities in Ghana. Another objective of the trip was to visit other maize research and associated projects in Togo. It may be noted that Togo is the first country in West and Central Africa to which the streak-screening technology has been transferred from IITA. IITA has also donated similar streak screening technologies to Ghana; consequently, the Network provided some funds to Ghana to assist in setting up the facilities. Hence, the need for the Ghanaian maize breeder to have a proper understanding and appraisal of the streak screening technology.

Dr. Badu-Apraku was accompanied on this visit by Dr. Twumasi-Afriyie, (another Ghanaian maize breeder) and Dr. Owusu-Akyaw, an entomologist of the Ghana maize program. They visited Ativeme, Sotouboua, Broukou, Salangashie, Tantieyou, and Toaga research stations.

4.2.1. Visit to Ativeme research station

Dr. Esseh-Yovo Mawule conducted the Ghanaian team around the streak screening facilities. The screenhouse which contained 12 cages measured 20 x 8 m. Each cage measured 1.25 x 1.25 x 2.00 m. There were 14 other cages outside the screenhouse. In addition, a screenhouse was under construction with funds from SAFGRAD maize network. The cages are for the rearing of Cicadulina leaf hoppers. C. mbila is a more efficient vector than C. triangula or C. arachid.

The leaf hoppers are raised on millet which is planted every week to ensure that 14-day old millet plants are available to the insects at all times. The millet is grown in pots in cages covered with a net to prevent contamination by other insects and mites. There were three types of cages : oviposition, nymphal and inoculation cages. Two-week old millet plants are placed in the oviposition cages for 1 week for the insects to lay their eggs. After 1 week, the millet plants are moved into the nymphal cages for 4 weeks.

Maize entries to be screened are planted in numbered pots, each pot containing 32 plants. Two days after emergence, the maize plants are placed in inoculation cages for 48 hrs for feeding and acquisition of the virus by the leafhoppers. The maize plants are then transplanted into the field. About 20,000 plants can be screened per week with the available facilities.

The Ghanaian team was informed that maize varieties from Côte d'Ivoire, Senegal, Niger and Burkina Faso are being converted by the Togo national program. The Togolese are using la Revolution, Poza Rica 43 SR, and TZESR as the sources of streak resistance in the conversion program.

Observations and comments

It is interesting to note the difference between the IITA and Togolese methods of inoculation. With the IITA method, 4-5 insects are released into the whorl of field planted maize plants after the insects had been knocked down with Co2 delivered from an inner tube. While the IITA method allows the screening of larger number of plants, some problem is encountered with it when it rains after inoculation. The Togolese method, on the other hand, places restriction on the number of plants that can be screened, even though the infection rate is higher.

About 20 cages for leafhopper rearing were outside the screenhouse. Leaf hoppers rearing in these cages was not efficient, due to excess moisture provided by the rain. It is suggested that plastic sheets be used to cover the top of the cage to protect the pots from the rain.

The Ghanaian team was very much impressed with the streak screening facility and has decided to model the different types of cages being constructed in Ghana on those used in Togo. It is planned to evaluate the three species of Cicadulina to determine the most efficient vector for the streak virus in Ghana. Even though the transplanting of inoculated plants into field has worked very well, the Ghana maize program would like to adopt the IITA technique of inoculation, i.e. releasing viruliferous leaf hoppers into the whorls of maize plants in the field.

4.2.2. Visit to Patatukou

The team visited nationally coordinated, on-farm trial with 3-4 entries and 2 replications each replicate consisting of 10, 10-m rows. The entries were Ikenne 8149, AB11 and a local variety. AB11 was found outstanding in terms of husk cover. In these trials, inputs were provided by the researcher whilst planting, fertilizer application and harvesting were done by farmer, under the supervision of the reseacher.

4.2.3. Visit to Sotouboua

The nationally coordinated variety trials (on-station trial) consisting of early/intermediate and late variety trials were visited at Sotouboua. The entries in the early/intermediate trials included IK8149, Pool 16 DR, AB12, AB22, Pool 16 SR, AB21 and the local variety. The varieties, AB22 and AB11 appeared very promising, despite a serious drought. The late variety trials involved the following varieties : EV8429 SR, TZUT-SR-W, EV8443-SR, TZ Syn I, ATK 72 ZR, EV8422-SR, 2L2-BD, and AT Syn I. In this trial, EV 8443 SR was the most outstanding entry.

Seed production of IK8149 SR, Pirsaback 8430, Poza Rica 43 SR, and La Maquina 43 was going on at Sotouboua.

4.2.4. Visit to Broukou Station

RUVT Extra-Early and RUVT-Early were also visited. In the RUVT Extra-Early, DR. Comp. Early was found to possess very poor husk cover. In the RUVT- Early, TZESR-W x Gua 314 BC1 F3 was very promising; the husk cover was comparable to that of the local variety. This variety has been improved by the Togo national program and it was under consideration for release. However, it needs to be made a little earlier. The varieties CSP x L. Raytiri F3 and TZEE-Y had very poor husk covers.

The nationally coordinated variety trial was also visited. At the Broukou station, the target variety of the breeder was AB11 and AB21, both of which have improved husk covers and grain types. However, in terms of yield, AB21 and AB11 were not different from Ikenne 8149. The breeder complained about the short height of Ikenne 8149 under unfavourable growing conditions. It is interesting to note that Ghana has problem with Aburotia (derived from Tuxpeno PB C16) also because of its short plant height; steps are being taken to replace Aburotia with a taller variety. In the late variety trial, Pop 22, Pop 29 and Pop

43 were all promising but Pop 43 was once again the most outstanding. The husk cover of Pop 43 SR has been improved by Togo through selection. The maize breeder indicated that AB 13, derived from a cross between Pop 43 SR and improved local, variety is in the pipe line.

The nationally coordinated, on-farm trials were also visited. The number of farmers invited to visit the on-farm trials ~~was~~ too low. It is, therefore, suggested that in future, as many farmers as possible should be invited to visit these trials.

4.2.5. Visit to Talangashie Station

The nationally coordinated, on-station variety trials funded by the World Bank were visited. All the trials were planted late, due to drought, and therefore, the plants were very young at the time of the visit.

4.2.6 Visit to Tantieou

The trials visited included RUVT Extra-Early and RUVT-Early and the nationally coordinated trials. The trials were well conducted and looked very good. The promising entries in the RUVT Extra-Early were CSP x L. Raytiri F3, TZESR-W x Gua 314 BC1 F3, Pop 30 x Gua 314 BC1 F3, and Pool 27 x Gua 314 BC1 F3. TZESR-W x Gua 314 BC1 F3 was particularly good and it is suggested that a serious thought be given to the need to convert it for streak resistance. Two varieties, Across 8131 x JFS x LR F2 and TZEY-Y, had very poor husk covers.

In the RUVT-Early, Across 88 Pool 16 DR and EV 8731 SR BCG were promising.

4.2.7. Visit to Toaga station

The nationally coordinated trials (Early/Intermediate) were visited. These trials were planted late and, therefore, the plants were very young at the time of the visit.

5. SAFGRAD II : PROPOSAL FOR EXTENSION

As SAFGRAD Phase II contract will end by 31 August, 1991, and SAFGRAD Phase III is expected to commence on 1 October, 1992, the Committee agreed on the need to submit a proposal seeking a 13-month extension of SAFGRAD II.

6. REPORT ON 1990 MONITORING TOUR

6.1. Introduction

A Monitoring Tour to Cameroon and Nigeria was undertaken 8-22 September, 1990 by selected members of the Network with the following objectives:

- i) to familiarize participants with the activities of the two countries, both of which are categorized by the network as Lead Centers for the implementation of some assigned research projects ;
- ii) to enable participants to gain experience on how maize research activities are linked with development agencies for the identification and resolution of maize production constraints in both countries;
- iii) to provide the national scientists an opportunity of visiting IITA and be intimated with its research strategies; and
- iv) to create a forum for interaction among national scientists and with international scientists for exchange of information and germplasm.

6.2. The Participants

With the exception of Guinea-Bissau, all the invited countries/institutions/organizations participated in the Monitoring Tour as follows :

<u>Country/Institution</u>	<u>Name of participant</u>	<u>Discipline/Position</u>
1. Cameroon	Charles Thé	Breeder
2. Central African Rep.	C. Ganglaou	Agronomist
3. Côte d'Ivoire	Koffi Attiey	Breeder
4. Gambia	Musa S. Mbenga	Agronomist/Breeder
5. Ghana	G. Aflakpui	Agronomist
6. Mali	N. Coulibaly	Agronomist
7. Niger	Jika Naino	Breeder
8. Nigeria	K.A. Elemo	Agronomist
9. Maize Network	J.M. Fajemisin	Network Coordinator and Pathologist/Breeder
10. OAU/STRC	Taye Bezuneh	Director of Research
11. IITA (Maize Program)	S.K. Kim	Breeder
12. IITA (Maize Program)	J. Kling	Breeder.

6.3. Visits to Cameroon and Nigeria

In Cameroon, the tour commenced from Nkolbisson Station where most of the maize genetic materials for evaluation in other lowland sites across the country are developed. The presence of considerable intensities of foliar diseases, including highland diseases like (Puccinia sorghi) rust and Helminthosporium turcicum blight can be positively exploited for selection of resistant genotypes.

In IRA/NCRE, Garoua, scientists were conducting agronomic and breeding research to address the increasing problem of Striga damage. Several experiments, comprising preliminary and advanced breeding generations and national and regional varietal trials,

were being conducted to solve problems of interest to the Network. The SAFGRAD-sponsored trials on developing agronomic package for early and extra-early maturing varieties were located at several sites in northern Cameroon. The excellent working relationship between the researchers and SODECOTON explained the outstanding progress in the adoption of improved maize varieties and the increase of the area under maize in the Cameroon savannas.

The trip to Maroua and environs revealed a close working relationship between sorghum and maize IRA/NCRE researchers. This was very clear with respect to Striga control strategy, on-farm testing, and field plot management.

In Nigeria, agronomic research at IAR/ABU on maize included developing management package for early and extra-early maize, intercropping and agroforestry. Participants also visited maize research activities of a privately managed seed company--Agricultural Seeds Ltd. The Agricultural Extension and Research Liaison Service of IAR/ABU was found to be a well-equipped and farmer-oriented institution. The cultivation and utilization of several thousands of tons of maize for industrial purposes (such as brewery and bakery), in Nigeria was seen by the participants as a way of motivating and sustaining the interest of farmers.

The visit to National Seed Service (NSS) was well appreciated. NSS coordinates national seed multiplication, foundation seed production, seed certification, and seed testing.

6.4. Recommendations

The following recommendations/suggestions were made by the tour participants.

- (i) Considering the tremendous amount of interaction with fellow scientists and the experiences gained within the 2-week period of the tour, the participants commended the idea of holding the tour and recommended that it should be a continuing activity of the Network.
- (ii) The participants appreciated the multi-disciplinary team approach of the Cameroon maize program and recommended that this philosophy be adopted and practised by all of the member-countries of the Network.
- (iii) In appreciation of the large and diverse germplasm for various research goals being managed by the Cameroon Program, the team suggested that a second trained maize breeder be recruited and be stationed in the North.
- (iv) The tour participants were impressed by the influence of the agronomic research at IAR/ABU on the expansion of maize in the Nigerian savannas (and indirectly in the neighboring countries), especially as all this has been done in close collaboration with the variety generating team based in the south of the country.
- (v) The NARS scientists, in recognition of the leadership position of IITA maize program in the generation of adapted and streak resistant germplasm, recommended continuing international donor support to resolve the remaining major maize production constraints, especially Striga damage, and to develop suitable screening techniques for stem borers and storage insect pests.

- (vi) Impressed by the good work of the National Seed Service of Nigeria, the participants recommended that neighboring countries take steps to obtain maximum benefit from the Nigerian experience.

7. PLAN FOR 1991 REGIONAL TRIALS

It was decided that national programs with entries to nominate for RUVT Extra-Early, RUVT-Early, and intermediate streak resistant variety trial should provide the supporting data and about 10 kg of seed.

Members of the Committee decided that entries for regional and international variety trials should be streak resistant, in order to qualify for nomination.

8. JOINT MAIZE, COWPEA AND SORGHUM NETWORKS' WORKSHOP (NIAMEY 1991)

It was decided that national scientists who had at the time of the meeting submitted titles of their papers, but not the abstracts, should be given more time to do so.

Dr. Taye Bezuneh informed members that funds are available for the proceedings to be published as a book. Editors are currently being identified. It is expected that Steering Committee members would present high quality papers, to highlight the experience of the last five years in maize research.

9. PROCEEDINGS OF THE 1989 JOINT MAIZE COWPEA WORKSHOP
IN LOME, TOGO.

The Network Coordinator informed members that good progress had been made in getting the proceedings of the 1989 Joint Maize-Cowpea Workshop held in Lome, Togo, published. The selected papers had been reviewed and were about to be put together.

10. RECOMMENDATIONS

The Steering Committee made the following recommendations.

1. In view of the lack of serious attention to storage and utilization in member countries, it is recommended that NARS and IARCs should intensify research on maize utilization and storage in West and Central Africa.
2. In view of the confusion surrounding terminologies of resistance and tolerance and the various scales for scoring for biotic and abiotic stresses and plant characters, it is recommended that the issue be discussed at the 1991 workshop in Niamey.
3. Having assessed the impact of IITA maize training courses on the Network, it was recommended that the present long term course should be alternated annually with short, intensive, topic-specific training courses; with the long term course, classroom work should not occupy more than 30 % of the time devoted to the entire course. In addition, the type of training, in which trainees are attached to particular scientists for variable periods of time to learn on the job, should continue.

4. In view of the crucial role expected of the technical back-stopping of SAFGRAD maize activities by IITA, the Committee expressed concern over the present procedure of appointing core scientists of IITA. It is strongly recommended that such positions should be properly and widely advertized in order to attract the best candidates while at the same time giving particular emphasis to the ability of the scientist to effectively interact with NARS scientists.
5. While appreciating the role of IITA in finished variety development, the network recommends that more emphasis should be placed on the development of base populations, particularly the development of heterotic groups up to the inbred line stage, so that finished product development could be delegated to NARS.
6. In view of the importance of the streak virus disease in West and Central Africa, and the availability of several good streak resistant varieties, the Committee recommends that only streak resistant varieties should be tested in the international and regional trials.
7. In view of the scheduled end of SAFGRAD Phase II, on 31 August, 1991, and the likelihood that SAFGRAD Phase III will not commence before October 1992, the Committee strongly recommends that a bridging, of 13-month extension of SAFGRAD Phase II (from September 1, 1991) be granted by the donors.

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