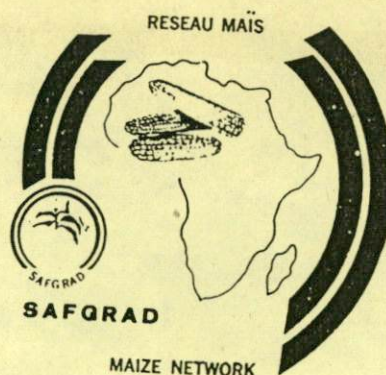


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WEST AND CENTRAL AFRICA MAIZE RESEARCH NETWORK :
REPORT OF 1987-1988 ACTIVITIES

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PRESENTED AT THE MAIZE-COWPEA NETWORKS JOINT
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WEST AND CENTRAL AFRICA MAIZE RESEARCH
NETWORK : REPORT OF 1987-1988 ACTIVITIES^a

J.M. FAJEMISIN
Maize Network Coordinator

1. BACKGROUND

1.1 Re-orientation of SAFGRAD Project

During its meeting of February 23-27, 1987, the assembly of Directors of National Agricultural Research of SAFGRAD member countries approved the re-orientation of the SAFGRAD Project emphasizing a collaborative mode that clearly defines the roles of the various partners involved in the implementation of the Project viz. National Programs, International Agricultural Research Centers, OAU/STRC, etc. It was decided that four crop-based Research Networks be established to "break down linguistic and political barriers and to judiciously pool human, infrastructure, material and financial resources of member countries to solve common problems of agricultural production and productivity". The West and Central Africa Collaborative Maize Research Network is one of the SAFGRAD Networks.

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

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

^a Presented at the Joint Workshop of SAFGRAD Maize and Cowpea Workshop held at Lome, Togo, 20-24 March, 1989.

1.2 Retrospect of 1987-Workshop

In fulfilment of the directives of the Directors of Agricultural Research, SAFGRAD, in collaboration with the International Institute of Tropical Agriculture (IITA), organized a Workshop for National Program Scientists working on maize in 18 SAFGRAD member countries of West and Central Africa from 23-27 March 1987 at Ouagadougou, Burkina Faso.

After a series of background papers from regional and international research organizations and of country reports by national program scientists, the constraints to maize production and productivity in the sub-region were reviewed together with the technologies that have been generated to solve some of these constraints (see Workshop Proceedings for details). It was found that, by and large, most of the national programs have common problems.

The presentation of country reports also permitted participants to understand the research priorities and capabilities of the various countries. Network research responsibilities were thereafter shared among national programs (lead centers) on the basis of their current research capabilities as indicated by availability of qualified research staff, physical facilities and infrastructure as well as optimum ecological conditions to screen for particular environmental constraints. Areas of research where national programs do not have the necessary expertise and/or infrastructure were suggested to regional and international research centres/organizations for effective implementation.

During the meeting, the scientists elected an Advisory Committee (Steering Committee) of six active maize scientists, in addition to the Network Coordinator as follows :

1. Dr. J.A. Ayuk-Takem (Cameroon)
2. Dr. E. Y. Mawule (Togo)
3. Dr. B. Badu-Apraku (Ghana)
4. Mr. Albert Cox (Gambia)
5. Dr. N.U.A. Idem (Nigeria)
6. Dr. G. Konate (Burkina Faso)
(replaced by Mr. Hema Idrissa, also of Burkina Faso,
from November, 1987).
7. Network Coordinator : Dr. A.O. Diallo (March 1987-May, 1988)
Dr. J.M. Fajemisin (May 1988 to date).

The following Organizations are also represented as observers in the Committee : IITA, SAFGRAD Coordination Office, USAID and INSAH.

The Steering Committee has the following roles :

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

2. STEERING COMMITTEE MEETINGS.

Since its establishment in March 1987, the Maize Steering Committee met four times in compliance with the guidelines laid out for Network implementation :

- First : March 26-27, 1987, Ouagadougou, Burkina Faso
- Second : November 9-12, 1987, Ouagadougou, Burkina Faso
- Third : April 7-9, 1988, Lomé, Togo
- Fourth : November 8-10, 1988, Zaria, Nigeria.

Each meeting was attended by at least 6 of the seven full members and with IITA representatives always in attendance as observers.

At each meeting, Network progress report was reviewed and the plan for future activities developed. Thus, the Steering Committee has been the principal body for program development. Also it was not only involved in monitoring the coordinating duties of the Network Coordinator but was also actively involved in the implementation of Network program.

3. STRATEGY

The principal objective of the West and Central African Maize Network (WECAMAN) is to ensure that all the National Programs effectively participate in the Network. The major pre-requisite for participation is the demonstration of the importance of maize in the socio-economic life of the prospective country. Strong National Programs are encouraged to generate appropriate technologies. These technologies as well as those developed by regional and international research centres are made available for testing and possible adoption by appropriate national programs.

Countries with relatively weak programs are given special assistance to enable them benefit from the activities of the Network. This emphasizes technical assistance in form of short-term training of technicians, technical visits of the coordinator or other resource persons for on-the-spot advice, provision of research materials, equipment and supplemental fund to facilitate the implementation of simple but relevant experimental trials, variety maintenance, and seed production.

4. STRENGTHENING NATIONAL PROGRAMS

4.1 Visits by the Network Coordinator and Members of the Steering Committee

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

Being experienced maize scientists, members of the Steering Committee were also individually assigned some countries to visit as follows :

<u>Country visited</u>	<u>Assigned Member of Steering Committee</u>
1. Chad	Dr. Charles Thé of Cameroon
2. Cape Verde	Mr. Hema Idrissa of Burkina Faso
3. Guinea-Bissau	Mr. Hema Idrissa of Burkina Faso
4. Senegal	Dr. E. Yovo Mawule of Togo.
5. Gambia	Dr. B. Badu-Apraku of Ghana.

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

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

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

4.2 Provision of Research Materials and Equipment

As a result of the visits to the weak national programs mentioned earlier, the Network provided them with assistance in the form of research materials. These included moisture testers, measuring tapes, pollination bags, etc. Details are provided in Appendix 1.

4.3. Provision of Research Funds

In addition to the provision of essential research equipment or materials some of the relatively weak countries were allocated four thousand dollars (\$4,000.00) each in 1988. The fund was to supplement national budgetary allocation in the management of maize trials, seed production and variety maintenance. The countries were : Benin, Burkina Faso, Guinea-Conakry and Senegal.

Some national programs are relatively strong in terms of personnel, infrastructure and maturity of their maize programs. However, all national programs are afflicted by inadequate financial resources. The Steering Committee therefore decided that some of the relatively strong national programs which have been identified as lead centres should be provided with funds to enhance their effectiveness in generating technologies for the Network. Togo (which accepted responsibility for generating technology for streak resistance screening) and Nigeria (for agronomic research) were allocated three thousand five hundred dollars (\$3,500.00) each in 1988.

4.4 Training

In an attempt to improve the capability of technicians from national programs to conduct research trials, the following six technicians participated in the 5 1/2 months residential training at Kamboinse in 1988 :

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

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

5. COLLABORATIVE RESEARCH

In collaboration with the National Maize Program of Burkina Faso, research was pursued in the priority areas of improvement of maize for drought resistance and the development of extra-early maturing maize germplasm for semi-arid zone of West and Central Africa.

5.1 Drought Resistance

5.1.1 Improvement of Pool 16 for drought resistance : Pool 16, an early maturing tropical white dent maize, was identified in 1982 by SAFGRAD for its drought resistance trait among the several early maturing cultivars tested under irrigation at Loumbila and Vallée du Kou in Burkina Faso.

Using the full-sib system of family improvement followed by the evaluation of the families under two levels of moisture stress, simple and tied ridges, Pool 16 has been subjected to two cycles of improvement for drought resistance. In 1987, the various cycles : CO, C1 and C2 were evaluated under varying levels of moisture stress at Kamboinse, Gampela, and Farako-Bâ.

A trend of improvement was observed (Table 1). A 7 % mean progress (in yield) per cycle was recorded under more stress conditions, 5% under medium stress and 4.7 % under less stress. Pool 16 DR C2 performed better than SAFITA-2 (a variety earlier developed from Pool 16 by SAFGRAD) by 28.9, 15.5, and 14.5 per cent under three decreasing levels of drought stress, that is, more, medium and less stress conditions, respectively.

Table 1. Grain yield (kg/ha) and days to 50 % silking of 3 cycles of selection for drought resistance in Pool 16 (data across 4 trials at two locations), 1987.

Materials	Grain yield kg/ha				Days to 50 % silking
	More stress	Medium stress	Less stress*	Mean	
Pool 16 DR CO	1654	2272	4699	2875	50.5
Pool 16 DR C1	1893	2374	4692	2986	50.6
Pool 16 DR C2	1846	2514	5093	3151	50.3
SAFITA-2	1432	2176	4462	2690	51.7

* Data from one location.

Also in 1987, S1 families were generated from the Pool 16 DR C2 full sibs. They were then test-crossed with the latest cycle of Pool 16 obtained from CIMMYT. One hundred and ninety-two test-crosses were evaluated at Kamboinse during 1988 growing season under tied and simple ridges. The test-cross families were arranged into 12 experiments of 20 entries per group consisting of 16 test-cross families and four recurring entries as checks namely CO, C1 and C2 of Pool 16 DR and Pool 16 (ex. CIMMYT used for the testcrossing). Simple and tied ridges were considered as main plots and the families as sub-plots. As 1988 was an extremely wet year in the sub-region, response to tied ridges was not as favourable in moisture utilization/conservation as in typical years ; it caused excessive moisture and therefore resulted in reduced crop growth and productivity. Nevertheless, marginal moisture stress condition was observed in the simple ridges as compared to tied ridges ; this was discernible during the second half of the growing season. Under such atypical situation, many parameters were considered in selecting the best 11 families that will eventually lead to the formation of the experimental variety Kamboinse 88 Pool 16 DR. Among the traits considered were good performance

under both simple and tied ridges, date to flowering, good husk cover and low counts for root and stalk lodging.

The same 192 testcrosses together with the four checks were evaluated in a 14 x 14 simple lattice experiment under high plant density, 106,666 plants/ha, at Farako-Bâ. The best 12 testcrosses were selected for the formation of the experimental variety, Farako-Bâ 88 Pool 16 HD. After a thorough examination of families across the various stress conditions : Kamboinse (drought/excess moisture) and Farako-Bâ (high density), the best 10 testcrosses were selected for the formation of Across 88 Pool 16 DR and the best 50 testcrosses selected for the generation of Pool 16 DR C3.

In the 1988/89 dry season, the F1 recombination of Pool 16 DR C3 and of the three experimental varieties were formed from the remnant seed of the S1 families that were used in producing the selected testcrosses. These will be planted under maize streak virus pressure at IITA- Ibadan and the streak resistant plants will be used to pollinate another set of the same materials planted simultaneously in a streak-free environment in order to increase the frequency of streak resistance in the population without any significant erosion of drought resistance.

5.1.2 Drought resistant germplasm pool : Based on the evaluation of over 70 early maturing maize cultivars under two moisture stress levels and the resulting highly significant Variety x Stress level interaction, five materials were selected for the formation of a drought resistant pool. They are Temperate x Tropical N° 42, Capinopolis 8245, Pool 16 DR, SAFITA-104 and Jaune Flint de Saria (JFS). Three other materials were added namely Drought resistant synthetic from IITA, Tuxpeno DR, and Maka, a local variety from Mauritania. A diallel of these cultivars were formed during the 1988 growing season. They were advanced to F2 in the 1988/89 dry season.

5.2 Extra-Early Maize

After an evaluation of early maturing accessions from Burkina Faso, Colombia, CIMMYT and India, two yellow varieties from Burkina Faso, -Bursanga Tollo and Kamandaogo Tollo- and a white Colombian variety Gua 314 were found to flower 43 days after planting and produced average yield of 2.5 T/ha. Unfortunately, they are susceptible to diseases and lodging and possess poor grain type. They were therefore crossed with some improved/adapted

early maturing varieties —TZESR-W, Pool 27, Pool 28, Across 8131, Pop 31-SR and DMR-ESR-Y— in order to develop composites that combine extra-earliness with desirable agronomic characters.

The best 10 F2 crosses identified from trials conducted at Kamboinse in 1986 were included in the RUVT-3 trial of 1987. Some of the crosses were backcrossed to the original extra-early entries as recurrent parents. The best backcrosses were recombined within colour group to form three extra-early white maize composites : TZEE-W-1, TZEE-W-2 and TZEE-W-3 and one extra-early yellow TZEE-Y. These extra-early composites were included as entries in the 1988 RUVT-3.

During the year 1988, the three white composites were recombined to form an extra-early white pool. This was then advanced to F2 during the same year. The extra-early yellow composite TZEE-Y was crossed with the earliest fraction of TZEF-Y, an early maturing germplasm in order to improve its plant type while at the same time retaining the extra-earliness.

6. REGIONAL TRIALS

In 1987 and 1988, three types of regional trials were offered by the Network to National Programs in the sub-region namely :

RUVT-1 : Drought resistant, early maturing varieties

RUVT-2 : Intermediate and full-season streak resistant varieties

RUVT-3 : Extra-Early maturing varieties.

The total number of trial sets requested increased from 52 in 1987 to 82 in 1988. Details of the request are summarized in Appendix 2.

Data were received for 28 sets from nine countries in 1987. As at February 28 1989, data for 1988 trials were received for 35 sets from seven countries.

Both years differed significantly in the amount of rainfall in the sub-region ; 1987 was drier than normal while 1988 received more rains than the 10 years-average. For example, in Kamboinse, Burkina Faso, rainfall in 1988 was 45 % more than in 1987 being 578.5 mm and 840.8 mm with 50 and 56 rainy days for 1987 and 1988, respectively. Across-location data on yield and days to silking for RUVT-2 and 3 for both years are summarized per location per trial in Tables 2 to 7. The summary of

all data output for the three trials have been compiled per year for all the test-locations received to date. They are available for distribution.

In 1987, Capinopolis 8245 was the highest yielding entry in RUVT-1. Entries from Pool 16 were within the best performing half of the entries (Table 2). Nine out of the 13 entries of RUVT-1 in 1988 were from Pool 16 with 7 entries being from Pool 16 DR (Table 3). Across 86 Pool 16 DR was the highest yielding across 11 locations in 6 countries ; it was 9.9 % more than the average yield of the entries and 27.9 % higher yielding than the local check.

The entries for RUVT-2 were different for both years. In 1987, entry EV 8422-SR gave the highest yield across the test-locations (Table 4). In the 1988 trials, Across 85 TZSR-W-1 was the highest yielder across 11 locations in seven countries (Table 5). Other high yielders in the trials were EV 8444-SR, TZPB-SR, Maracay 7921-SR and EV 8422-SR.

Pop CSP Early was the highest yielding entry in the extra-early variety trial, RUVT-3 in both years 1987 and 1988 with average yield of 2.7 and 3.5 t/ha, respectively. It was earlier than the local check. The earliest entries in 1987 originated from crosses having Kamandaogo Tollo (K. Tollo) as a parent with 41 or 42 days to silking compared to 46 days for the local check (Table 6). In 1988, across-location data showed that TZEE-Y flowered earliest —42 days compared to 51 days for the local check (Table 7).

7. MONITORING TOUR

7.1. Introduction

A Monitoring Tour of Burkina Faso and Ghana national programs was organized from September 12-20, 1988. This biennial event, which alternates with biennial Network Workshop, is designed to enhance interaction among maize research workers in the sub-region. It enables scientists to become aware of the problems and potentials of maize production in other countries and to observe how production constraints are being tackled by other scientists.

Table 2. Grain yield and days to 50 % silking of varieties tested in RUVT-1 locations in 1987.

Variety	GRAIN YIELD (T/HA)														Variety Mean	Days to 50 % Sil- king
	BURKINA FASO			GAMBIA		GHANA	GUINEE CONAKRY		NIGER	NIGERIA	SENEGAL	TOGO				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Capinopolis 8245	5.05	4.85	1.30	4.02	3.90	3.43	5.89	2.05	2.08	0.50	1.45	5.00	4.72	2.90	3.42	52
Early 84 TZESR-W	4.43	4.70	1.34	3.48	4.40	4.12	5.20	1.82	2.48	0.48	1.73	5.09	3.96	3.48	2.34	50
SAFITA-2 RE	5.12	4.14	0.91	2.87	4.98	2.56	5.43	3.08	2.45	0.55	1.68	6.06	5.33	2.56	3.28	52
Kamb(1)84 TZESR-W	4.50	4.68	1.29	3.30	4.62	2.66	4.42	2.05	2.83	0.43	2.02	5.46	3.73	3.57	3.25	51
Pool 16 DR C1	4.26	4.34	1.19	4.45	5.05	2.99	4.83	2.04	3.00	0.49	1.57	4.64	3.61	3.06	3.25	50
EV 8431 SR	4.79	4.06	0.94	3.36	4.00	3.53	4.60	2.23	1.81	0.61	2.04	5.40	3.77	4.00	3.22	49
Pool 16 DR CO	3.95	4.41	0.72	3.58	5.00	3.03	5.17	2.21	2.26	0.74	1.66	4.99	3.83	3.37	3.21	51
Kawanzie	4.88	4.41	0.69	3.44	5.14	2.75	5.23	2.32	3.12	0.32	1.26	5.09	3.06	2.44	3.15	51
Pop 30 SR (E)	4.07	4.67	1.25	2.86	3.52	3.17	4.69	2.89	2.74	0.74	1.50	4.34	3.23	3.72	3.10	50
Local check	2.71	4.00	1.31	2.80	4.57	2.93	5.39	3.91	1.34	0.69	1.93	4.77	3.06	1.71	2.94	53
Pop CSP	3.98	4.05	0.80	3.11	4.83	2.94	4.05	1.64	2.18	0.51	1.28	4.88	3.44	2.67	2.88	47
Kamb(1) 8433	3.55	3.48	1.83	3.35	4.10	3.06	4.13	1.29	1.89	0.66	1.21	5.10	3.80	2.17	2.83	50
TZEF-Y-F3	3.82	4.29	1.29	3.52	4.81	2.55	3.96	1.26	1.44	0.67	1.57	4.94	2.77	2.28	2.80	47
Location mean	4.24	4.31	1.14	3.40	4.53	3.06	4.85	2.21	2.28	0.57	1.61	5.12	3.58	2.92	3.13	50
L.S.D. 5 %	0.79	1.12	0.94	1.23	1.10	1.18	1.99	0.51	0.78	0.27	0.47	1.50	0.86	0.63		
Prob. of F.	0.000	0.542	0.512	0.337	0.092	0.366	0.702	0.000	0.000	0.077	0.007	0.650	0.010	0.000		
C.V. %	13	18	57	25	17	27	29	16	24	32	20	20	17	15		

^a Location codes : 1 = Farako-Bâ (A season), 2 = Farako-Bâ (B season), 3 = Gampela, 4 = Kamboinse, 5 = Sapu, 6 = Nyankpala, 7 = Bordo-Kankan, 8 = Kilissi, 9 = Pita, 10 = Kolo, 11 = Ibadan, 12 = Nioro, 13 = Sinthiou and 14 = Broukou.

Table 3. Grain yield, days to 50 % silking and ^a% grain moisture at harvest of varieties tested in RUVT-1 (drought resistant maize) trial at 11 locations in 6 countries in 1988.

Variety	G R A I N Y I E L D (T/HA)											Days to 50% sil- king	Mean % Mois- ture	
	BENIN		BURKINA FASO			C A R ^b		CAMEROON		NIGERIA	TOGO			Variety Mean
	1	2	3	4	5	6	7	8	9	10	11			
Across 86 Pool 16 DR	4.95	4.88	4.45	5.45	5.08	2.84	6.32	5.33	4.04	3.38	2.24	4.45	53	20.8
Pool 16 DR CO	5.33	4.85	3.94	5.51	4.63	3.41	5.50	5.51	2.92	2.42	2.08	4.19	52	19.9
Early 86 Pool 16 DR	4.60	4.40	3.94	4.79	5.26	3.29	5.60	4.98	3.17	3.26	2.55	4.17	52	20.3
Kamboinse 86 Pool 16 DR	4.77	4.88	4.46	4.62	4.39	3.42	5.27	5.34	2.85	3.22	2.61	4.17	54	20.7
AB 22	6.01	5.07	4.92	3.79	3.12	4.05	5.24	5.45	3.42	2.63	2.06	4.16	56	24.1
Pool 16 DR C1	5.17	4.61	4.85	4.73	3.81	3.22	5.47	5.06	3.01	3.46	2.24	4.15	53	21.2
Pool 16 DR C2	5.29	4.77	5.03	4.76	4.61	2.41	5.31	4.90	2.96	3.02	2.33	4.12	52	20.7
Across 86 Pool 16	4.83	4.92	4.20	5.75	4.85	2.39	5.37	4.99	2.66	2.99	2.39	4.12	51	19.1
Farako-Bâ 86 Pool 16 HD	4.81	4.26	3.80	5.08	5.01	3.17	5.49	4.86	2.90	3.04	2.03	4.04	52	20.7
SAFITA-2 (RE)	5.21	4.47	3.84	5.18	3.79	4.02	5.58	4.76	2.37	2.65	2.20	4.01	54	21.6
Kamboinse(1) 84 TZESR-W	4.82	4.30	3.74	4.94	3.94	2.73	5.41	4.68	3.06	3.08	2.44	3.92	52	19.6
Kawanzie	5.17	4.30	4.47	4.01	4.24	3.12	4.09	3.86	2.70	2.86	2.17	3.73	52	19.7
Local check	4.61	2.72	3.56	4.11	4.61	2.63	4.98	4.60	2.85	1.74	1.88	3.48	58	19.6
Location mean	5.04	4.49	4.25	4.83	4.41	3.12	5.36	4.95	2.99	2.90	2.25	4.05	53	20.6
L.S.D. 5 %	0.65	1.00	1.36	1.23	1.44	1.35	0.14	0.80	0.73	0.25	0.71			
Prob. of F.	0.009	0.006	0.416	0.061	0.170	0.204	0.018	0.017	0.017	0.003	0.707			
C.V. %	9	15	22	17	23	30	12	11	17	18	22			

^a Location codes : 1 = Angaradebou, 2 = Bagou, 3 = Fada, 4 = Farako-Bâ, 5 = Kamboinse, 6 = Grimari, 7 = Garoua, 8 = Sanguerre, 9 = Samaru, 10 = Broukou and 11 = Tantiegon.

^b Central African Republic.

Table 4. Grain yield and days to 50 % silking of varieties tested in RUVT-2 at 9 locations^a in 6 countries in 1987.

Variety	GRAIN YIELD (T/HA)									Variety Mean	Days to 50 % Sil- king
	BURKINA FASO		GHANA	GUINEA CONAKRY		MALI	SENEGAL		TOGO		
	1	2		4	5		7	8			
EV 8422-SR	5.88	3.32	4.15	6.91	2.99	1.90	5.21	5.52	4.87	4.53	62
Across 83 TZUT-W	5.67	4.14	2.81	7.26	2.12	2.81	6.56	5.00	4.23	4.51	57
EV 8443-SR	5.51	4.13	3.71	7.10	2.84	1.50	6.36	4.81	4.49	4.49	59
Kamboinse(2) 83 TZUT-W	5.76	5.67	4.60	5.66	2.69	2.00	5.78	4.50	3.42	4.45	58
EV 8428-SR	5.65	3.56	5.09	5.76	3.30	1.22	6.47	4.93	3.65	4.40	58
Farako-Bâ 85 TZSR-W-1	5.23	4.28	3.44	6.40	3.46	2.09	6.62	4.44	3.32	4.36	60
Loumbila 84 TZUT-Y	5.63	3.46	2.91	6.87	1.75	1.87	6.16	4.95	2.99	4.07	55
Local check	4.01	4.86	3.75	3.30	2.46	1.83	7.08	4.97	2.22	3.83	57
Samaru 83 TZSR-Y-1	5.16	3.70	3.77	4.46	2.98	1.08	6.38	3.46	2.93	3.77	59
EV 8449 SR	4.86	3.32	3.93	4.79	1.98	1.19	5.36	4.15	3.90	3.61	56
SAFITA-102 RE	4.73	3.68	2.35	4.58	2.29	1.02	5.34	3.66	1.92	3.29	55
Aborotia	4.43	2.78	2.40	4.70	2.81	1.67	4.22	4.46	1.88	3.26	58
Location mean	5.21		3.49	5.65	2.64	1.68	5.96	4.57	3.32	4.05	58
L.S.D. 5 %	0.75		1.57	2.07	0.40	0.75	1.28	0.97	0.91		
Prob. of F.	0.000		0.023	0.005	0.000	0.001	0.004	0.006	0.000		
C.V. %	10		31	25	11	31	15	15	19		

^a Location codes : 1 = Farako-Bâ (A season), 2 = Farako-Bâ (B season), 3 = Nyankpala, 4 = Bordo-Kankan, 5 = Kilissi, 6 = Sotuba, 7 = Nioro, 8 = Sinthiou, 9 = Broukou.

Table 5. Grain yield and days to 50 % silking of varieties tested in RUVT-2 (intermediate and late maturing maize) trial at 11 locations^a in 7 countries in 1988.

Variety	GRAIN YIELD (T/HA)											Variety Mean	Days to sil- king		
	BENIN		BURKINA FASO		CAMEROON		C A R ^b	GHANA	NIGER	NIGERIA				TOGO	
	1	2	3	4	5	6	7	8	9	10	11				
Across 85 TZSR-W-1	2.83	6.12	4.13	4.55	4.67	3.83	3.52	3.00	3.41	4.48	1.94	3.86	66		
EV 8444-SR	3.09	6.02	3.37	5.24	3.80	3.56	2.27	3.85	4.01	4.46	1.83	3.77	61		
TZPB-SR	3.25	5.61	3.86	4.49	4.07	3.94	3.72	2.63	2.94	5.15	1.51	3.74	66		
Maracay 7921-SR	2.82	6.02	3.38	4.49	5.25	3.02	2.63	2.89	3.19	4.54	1.67	3.63	65		
EV 8422-SR	3.41	6.52	3.78	3.58	4.09	3.30	2.50	2.90	3.33	4.74	1.87	3.63	65		
EV 8428-SR	3.38	5.35	3.00	4.98	3.87	3.54	3.09	2.75	3.60	4.75	1.40	3.61	63		
Farako-Bâ 85 TZSR-W-1	3.29	5.59	3.65	3.98	3.79	3.86	2.99	3.37	2.49	4.59	1.74	3.58	66		
Loumbila 84 TZUT-Y	3.01	6.57	4.02	5.09	3.77	2.92	2.17	3.15	2.55	4.03	1.89	3.56	60		
Farako-Bâ TZSR-Y-1	2.15	6.58	3.41	3.88	4.16	4.21	2.48	3.21	2.39	4.40	2.07	3.54	65		
Local check	2.80	6.12	4.30	4.19	5.35	2.74	2.15	2.38	2.19	4.31	1.68	3.48	64		
EV 8445-SR	3.29	6.08	3.80	4.13	4.00	3.21	2.03	2.66	2.07	4.44	1.64	3.40	64		
Aburotia	3.05	5.86	3.18	5.26	4.24	2.88	1.85	2.40	3.10	3.24	2.24	3.39	62		
Location mean	3.03	6.04	3.66	4.49	4.25	3.42	2.62	2.93	2.94	4.43	1.79	3.60	64		
L.S.D. 5 %	1.13	1.75	1.13	1.56	1.47	1.32	1.12	1.23	0.98	0.76	0.60				
Prob. of F.	0.644	0.937	0.445	0.396	0.349	0.394	0.029	0.497	0.005	0.006	0.287				
C.V. %	26	20	21	24	24	27	30	29	23	12	23				

^a Location codes : 1 = Ina, 2 = Farako-Bâ, 3 = Vallée du Kou, 4 = Garoua, 5 = Sanguere, 6 = Grimari, 7 = Nyankpala, 8 = Bengu, 9 = Samaru, 10 = Broukou, and 11 = Tantieyou.

^b Central African Republic.

Table 6. Grain yield and days to 50 % silking of varieties tested in RUVT-3 at 7 locations^a in 6 countries in 1987.

Variety	G R A I N Y I E L D (T/HA)							Variety Mean	Days to 50 % Sil- king
	BURKINA FASO		GAMBIA	NIGER	NIGERIA	SENEGAL	TOGO		
	1	2							
Pop CSP Early	4.80	1.43	4.52	0.27	1.41	4.68	2.08	2.74	45
Across 8131xJFSxL.Raytiri F4	4.94	1.70	5.14	0.36	1.05	4.47	1.28	2.71	46
CSP x L. Raytiri F2	4.21	1.64	4.81	0.38	1.49	4.31	1.23	2.58	46
Pool 27 x GUA 314 F4	4.71	1.53	4.00	0.68	1.09	4.10	1.70	2.54	44
Pool 28 x GUA 314 BC1 F2	4.15	1.56	4.19	0.27	1.09	3.98	1.96	2.46	45
Pop 30 x GUA 314 F4	3.68	1.44	4.05	0.54	1.31	4.12	1.76	2.41	45
TZESR-W x GUA 314 BC1 F2	4.06	1.47	3.81	0.39	1.26	3.52	1.86	2.34	45
Pool 29 x K. Tollo F4	3.80	1.63	4.10	0.38	1.40	3.34	1.70	2.34	42
Local check	4.66	1.43	4.16	0.23	1.10	3.33	1.41	2.33	46
DMR-ESR-Y x JFS x K. Tollo F4	3.93	1.64	4.29	0.44	1.19	2.50	1.65	2.24	43
Pop 46 x K. Tollo F4	3.55	1.34	4.19	0.46	0.90	3.30	1.49	2.18	42
WIR 17215 x K. Tollo BC1 F2	3.64	1.28	4.14	0.23	0.63	2.57	1.20	1.96	41
Location mean	4.18	1.51	4.28	0.39	1.16	3.69	1.61	2.40	44
L.S.D. 5 %	0.83	0.57	0.69	0.30	0.39	0.68	0.59		
Prob. of F.	0.010	0.927	0.024	0.002	0.004	0.000	0.483		
C.V. (%)	14	26	11	36	23	13	31		

^a Location codes : 1 = Kamboinse, 2 = Gampela, 3 = Sapu, 4 = Kolo, 5 = Ibadan, 6 = Nioro, 7 = Broukou.

Table 7. Grain yield, days to 50 % silking and % grain moisture at harvest of varieties tested in RUVI-3 (extra-early maize) trial at 9 locations^a in 5 countries in 1988.

Variety	G R A I N Y I E L D (T/HA)									Days to 50 % Silking	Mean % Mois- ture			
	BENIN			BURKINA FASO			CAMEROON					NIGERIA	TOGO	Variety Mean
	1	2	3	4	5	6	7	8	9					
Pop CSP Early	2.31	3.81	4.83	3.48	4.78	3.96	3.92	2.63	1.87	3.51	46	29.0		
CSP x L. Raytiri F2	2.11	3.47	6.58	3.33	4.99	3.97	2.64	2.42	1.60	3.46	48	26.6		
Local check	2.33	3.97	4.78	3.10	4.17	4.62	3.01	1.92	1.88	3.31	51	27.9		
TZEE-Y	1.97	4.21	4.54	3.26	4.81	3.57	1.57	2.82	2.25	3.22	48	28.1		
Across 8131 x FJS x LR F4	1.86	3.56	4.93	3.31	4.26	3.46	2.03	2.36	1.97	3.08	47	28.3		
TZESR-W x GUA 314 BC1 F2	2.17	3.29	4.30	2.66	3.48	3.62	2.62	2.96	2.01	3.01	46	25.4		
TZEE-W-2	1.89	2.97	3.90	3.47	3.48	2.79	2.80	2.66	1.59	2.84	45	26.7		
Pop 30 x GUA 314 BC1 F2	1.83	2.89	3.59	2.93	4.17	3.33	2.12	2.56	1.95	2.82	45	27.3		
Pool 27 x GUA 314 BC1 F2	1.83	2.64	3.74	2.97	3.66	2.68	1.35	1.81	1.42	2.46	45	27.0		
TZEE-W-1	1.75	2.30	3.55	3.14	3.38	2.61	1.71	2.17	1.55	2.46	46	26.2		
TZEE-Y	1.44	2.25	3.17	2.16	3.76	2.90	1.78	1.36	1.47	2.26	42	26.5		
Pool 28 x GUA 314 BC1 F2	1.64	1.57	3.54	2.48	3.12	2.40	1.32	1.73	1.68	2.16	44	26.2		
Location mean	1.93	3.08	4.29	3.02	4.00	3.33	2.24	2.28	1.77	2.88	46	27.4		
L.S.D. 5 %	0.41	0.78	1.45	1.17	0.92	1.08	0.57	0.42	0.61					
Prob. of F.	0.003	0.000	0.003	0.457	0.002	0.005	0.000	0.000	0.204					
C.V. %	15	17	23	27	16	23	18	13	24					

^a Location codes : 1 = Guène, 2 = Niaouli, 3 = Kamboinse, 4 = Saria, 5 = Garoua, 6 = Sangouere, 7 = Samaru, 8 = Broukou, and 9 = Tantiegon.

The participants, from seven countries, comprised research workers from weaker national programs, scientists with little research experience, and two resource persons (namely, one experienced agronomist and the Network Coordinator). These participants are listed below.

<u>Participant</u>	<u>Country</u>	<u>Position</u>
1. Lansana TOURE	Guinea-Conakry	Breeder
2. CH. Gouro YALLOU	Benin	Breeder
3. Payaro TOKY	Togo	Agronomist
4. Abdou NDIAYE	Senegal	Breeder
5. Jacob SANOU	Burkina Faso	Breeder
6. N.U.A. IDEM (Dr)	Nigeria	Agronomist
7. Nadingar ALLADOUMYNGUE	Chad	Director of Research
8. J.M. FAJEMISIN (Dr.)	SAFGRAD	Network Coordinator (Pathologist & Breeder).

7.2 Tour of Burkina Faso (September 12-14, 1988)

At Kamboinse, the participants were conducted round various types of National Variety Trials by Mr. Hema Idrissa, the maize breeder in-charge. Among these were (i) early maturing trials (ii) extra-early trial (iii) drought resistant trials ; and (iv) local variety trial. The Regional Uniform Variety Trials RUVT-1 and RUVT-3 were also observed.

There was seed multiplication of two varieties identified for national release namely (a) KPB (Kamboinse Precoce Blanc) which originated from the variety Kamboinse 84(1) TZESR-W and (3) KPJ (Kamboinse Precoce Jaune) originating from EV 8431-SR. A multifactorial agronomy trial of 4 varieties x 4 population densities x 3 levels of Nitrogen was also observed.

The Maize Network Coordinator showed the collaborative research trials and nurseries, particularly the use of simple and tied ridges in simulating varying levels of moisture stress for drought resistance screening. The participants also visited on-farm demonstration of the modifications of the donkey-drawn tied ridger mounted by Mr. Kerry Sly of IITA-SAFGRAD.

At Farako-Bâ, about 370 km from Ouagadougou, Mr. Sanou Jacob, the maize breeder in-charge showed the collaborative research on evaluation of Pool 16 DR testcrosses under high population density. Participants carried out visual selection of families in this trial; many of the selections were common. In addition to carrying out the Regional Uniform Variety Trials RUVT-1 and RUVT-2, the National Program conducted studies on Composite Y, varietal collection from different sources, the improvement of local varieties and the development of testcrosses using Tzi lines. Seed multiplication of elite local varieties (Jaune Flint de Saria, Maka) and improved varieties (SR 22, IRAT 80 and IRAT 71) was also observed.

In spite of the very wet season, severe termite attack was observed in the multiplication plots. A similar observation was made in Benin by Mr. Yallou, one of the monitoring tour participants.

7.3 Tour of Ghana (September 15-19, 1988)

Participants were briefed about the activities of the Nyankpala Agricultural Experimental Station near Tamale, the Crops Research Institute, Grain and Legume Development Board, Ghana Seed Company and the Global 2000 Project.

Dr. Badu-Apraku, the National Maize Program and his colleagues showed the participants various On-Station and On-Farm trials in the environs of both Nyankpala and Damongo. Seed production activities were very intensive and impressive. They were reinforced with seed production agronomy. In one of the On-Station trials, samples of seed of the same variety but produced by two different seed agencies (Ghana Seed Company and Grain and Legume Development Board) were compared with the sample of the same variety produced by the Crops Research Institute, the originator, in order to monitor seed quality. On-farm trials were not limited to variety trials ; they included fertilizer and weed control trials. Among several other trials was one on the response of two hybrids (8321-18 and 8321-21) and improved open-pollinated variety to population density and nitrogen levels. Participants also carried out an exercise in selecting among testcrosses developed between elite populations of the Ghana Maize Program and Tzi lines.

The Global 2000 Project was acclaimed to be a very effective method of achieving a dual objective of verification and extension of package of research findings. The Project which started about two years ago now has thousands of farmers in its "Movement".

7.4. Wrap-Up/Reporting Session

Before departing, each participant expressed his individual assessment of the entire monitoring tour with special reference to its organization, content and relevance. Their views are summarized below.

Participants were unanimous in acknowledging the opportunity to take part in the monitoring tour, and expressed their gratitude to the Network. They recommended that it should be a continuing activity. It was noted that the tour broke the language barrier which always tends to create unnecessary hindrance to exchange of ideas. The younger participants found the activities of the more experienced scientists very inspiring. The Burkinabe Program, though relatively young, was found to be highly committed. It however lacked the vital linkage with farmers ; thus, seed production activities are either non-existent or not structured. By contrast, the Ghana Program is all-embracing and balanced, in depth and breadth.

Participants made several notes on interesting germplasm and made instant requests for seed. They promised to keep the new contacts alive, for exchange of materials and information.

8. ATTEMPTS TO HARMONIZE MAIZE RESEARCH NETWORKS

During the past year, the existence of two Maize Research networks in the sub-region was discussed with a view to harmonizing their activities. The two Networks are the SAFGRAD West and Central African Maize Network (WECAMAN) and the Franco-African Maize Network (FAM).

WECAMAN consists of maize-producing SAFGRAD member countries of West and Central Africa while FAM consists of Francophone African countries except Zaïre, Rwanda and Burundi. FAM Network was said to be established to cater for those ecological zones in Francophone African countries that were

apparently not adequately catered for by the SAFGRAD Maize Network (i.e. the rain forest zone and the highlands - 1000 to 2000 m above sea level), although the needs of these zones were covered by research efforts of CIMMYT and IITA.

Many meetings were held at different levels —Steering Committee, Council of National Directors of Agricultural Research of SAFGRAD member countries, and one meeting among officials of IITA, SAFGRAD and CORAF— to discuss this issue. An quick resolution of the matter is essential to a judicious use of the limited human and financial resources potentially available to National Programs for maize research in the sub-region.

9. CONCLUDING REMARKS

The West and Central African Maize Research Network (WECAMAN) has enhanced the spirit of collaboration among maize scientists in the sub-region. It has helped in identifying qualified research scientists in the planning and implementation of the objectives of the Network. This has resulted in desirable interaction with other national programs and in increased overall effectiveness of Networking. The provision of some vital research materials and equipment and of some supplementary finds has challenged the scientists to greater achievement and accountability.

With greater support —financial and moral— from the respective national governments, these various effects to strengthen National Programs and to encourage the emergence of committed national program scientists will lead to a sustained improvement in maize productivity in the semi-arid zone of West and Central Africa.

Appendix 1a. Research materials distributed to the national programme of Mali.

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

Appendix 1b. Research materials delivered to the national programme of the Republic of Guinea.

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

Appendix 1c. Research materials delivered to the national programme
of the Central African Republic.

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

Appendix 1d. Research materials delivered to the national programme of Burkina Faso.

Item	Quantity	Total price US \$
Cutler	6	16.6
Calculator (El 356)	1	20
Calculator (El 240)	4	48
Sprayer 16 l	2	213
Sprayer attachment	2	15.9
Rakes	5	14
Glue pots SADER	4	43.9
Painted jerry cans 20 l	2	93.3
Jerrycan power spouts	2	38.8
Slide calipers	2	15.3
Hammers N° 45	3	91
Navying shovels	5	20.7
Folding shovels	2	26.8
Navying pics	5	55.8
Hevex hoes	5	46.7
Butcher's knives	5	39.6
Plastic pans	5	19.7
Fivefold decameter	1	144.7
Platic tape	8.4	47.6
Cloth	320 m	806.7
Plastic	10	50
Taylor labour	6-	50
Carpet marker	2	5.3
Rubber	3	3?1
Blue ball point pen	40	6.2
Bag welder	1	70
Small seed envelopes	1000	6
Large seed envelopes	1000	11
Labels	1000	9
Scales	2	74.4
Measuring tape	1	20
Hammer	1	9
Field books	10	52
Staplers	2	30
Staple boxes	2	10
Markers	12	8
TOTAL		2223

Appendix 1e : List of other countries supplied with moisture testers

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

Appendix 2 . Number of sets of Regional Uniform Variety Trials (RUVT) requested per country, 1987.

Country	Number of trials requested					
	RUVT-1		RUVT-2		RUVT-3	
	1987	1988	1987	1988	1987	1988
Bénin	2	4	2	2	2	4
Burkina Faso	2	3	1	2	1	3
Cameroon	1	3	1	2	-	2
Cape Verde	-	-	-	-	2	2
Central African Republic	2	2	2	1	-	1
Côte d'Ivoire	1	2	-	1	-	3
Gambia	2	2	-	-	2	2
Ghana	1	1	1	1	-	-
Guinea Bissau	-	2	-	2	1	3
Guinea-Conakry	3	-	2	4	-	-
Mali	-	-	1	-	1	-
Niger	-	1	-	1	-	1
Nigeria	2	1	1	2	-	1
Senegal	2	3	2	3	1	3
Tchad	1	1	-	1	2	1
Togo	3	3	2	3	3	3
T O T A L	22	28	15	25	15	29

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