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WEST AND CENTRAL AFRICA COWPEA NETWORK
"Réseau Niébé de l'Afrique Centrale et Occidentale"
(R E N A C O)

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REPORT
OF THE 1990 MONITORING TOUR

EDITED BY :

NYANGUILA MULEBA

RENACO COORDINATOR
IITA/SAFGRAD, 01 B.P. 1495 OUAGADOUGOU 01,
BURKINA FASO

JEAN DETONGNON

COWPEA BREEDER
DIRECTION DE LA RECHERCHE AGRONOMIQUE
ATTOGON, BENIN

Bibliothèque UA/SAFGRAD
01 BP. 1783 Ouagadougou 01
Tél. 30 - 60 - 71/31 - 15 - 98
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I.
INTRODUCTION

1. Introduction

Among other things, Monitoring Tour was one of the major activities of RENACO which took place from 27 August to 14 September 1990. The objectives of the tour were to allow scientists from RENACO Lead and some Technology Adapting Centers to visit research activities of Burkina Faso, Niger, Nigeria in order to interact with scientists from those countries and exchange ideas on methodologies in cowpea research. Nine scientists from Benin (1), Burkina Faso (2), Cameroon (1), Ghana (1), The Gambia (2), Niger (1) and Nigeria (2) participated in the tour. The report of the tour is presented in this document.

VISIT TO BURKINA FASO

The tour in Burkina Faso took place from 27 August to 1 September, 1990.

1. Courtesy calls

Director of INERA: The Director of the "Institut d'Etudes et de Recherches Agricoles" (INERA), Dr. C. Belem welcomed participants to Burkina Faso. He commended the efforts RENACO is making to solving problems of cowpea production in the semi-arid zones. Participants also had the opportunity to exchange views with the Director on various subjects, such as the organization and financing of agricultural research activities in Burkina Faso. Participants noted that there was a need of strengthening the number of research personnel in the country.

International Coordinator of SAFGRAD: The participants met with Dr. J.M. Menyonga, International Coordinator, SAFGRAD, who briefed them on the activities of SAFGRAD. He emphasized the need for more collaboration between SAFGRAD networks. To this end a joint workshop is being organized for March 1991 in Niamey (Republic of Niger). The International Coordinator also briefed participants on the efforts being made to secure financial support for the third phase of SAFGRAD, which is expected to commence in September, 1991.

Chief of the Kamboinse Research Station: Participants met with the Chief of the Station, Mr. G.R. Zangre who briefed them on the activities of the station which was created in 1954 with the aim of working on irrigated rice, vegetable and tree crops. From 1977, with the presence of ICRISAT and IITA, the station started working on other crops. The offices of the SAFGRAD maize and cowpea networks are located at the station.

2. Interaction with cowpea scientists

Dr. Clementine Dabire (Mrs), the Burkina national cowpea program coordinator introduced the cowpea research team and presented an overview of the national cowpea program.

Burkina Faso is a Lead Center for cowpea breeding, entomology and pathology. Research activities are carried out in three ecologies: Sahel (Pobe), Sudan savanna (Kamboinse), northern Guinea savanna (Farako-Bâ). The cowpea research team includes: 2 breeders (I. Drabo and J. Ouedraogo), an entomologist (Dr. C. Dabire), a physiologist (Dr. Sessouma), a pathologist (Dr. P. Sereme) and a virologist (Dr. G. Konate). Each scientist briefed participants on the objectives and methodologies of his or her research with the exception of I. Drabo who is on study leave and Konate and Sessouma who were absent.

3. Field visits to Pobe

Pobe is located in the Sahel ecology with an annual rainfall of 200-600 mm. This environment is also characterized by high temperature and occasional sand-blasts. The following trials were being conducted at the time of the visit.

a) Cowpea breeding

Preliminary yield trials: There were two sets of trials. The first consisted of several lines derived from crosses of B 301 and best sources of Striga resistance in Burkina while the second consisted of lines that combined Striga, bruchids and aphids resistance: cultivar IT82D-716 was used as a common parent. The trials were sown at two dates, 5 and 21 July, 1990.

- . Advanced yield trials: Eight cultivars from Burkina, IITA/SAFGRAD and IAR were being tested in pure stands and mixture with millet and without insecticide application.
- . Dual purpose cowpea trials: Twelve cultivars from different origins (Burkina, IITA/SAFGRAD, IAR) were being tested.
- . F₄ population: The segregating population was derived from various crosses, eg: KVx 404: TVx 1509 x KVx 396-4-2.

KVx 403: (KVx396-4-2 x KVx396-16-10-2) (KVx396-4-2 x IT84S-2246-4), etc. The populations were sown on two dates, 5 and 21 July, 1990 each with and without insecticide application.

b) Cowpea agronomy

- . Protection against heat stress and sand-blast: Three factors were tested: wind break (using straw fence), mulching (mulched and unmulched), and variety (TN88-63; KVx 396-4-4; IT82E-32 and Poble Local). The trial was sown on 5 July 1990. Responses to mulching and wind break were observed.

4) Field Visit to Kamboinse in the Sudan Savanna

a) Cowpea breeding

Cowpea breeding research activities involved mainly lines from crosses derived from B 301, a Striga resistant cultivar. The trial was conducted on a field naturally infested with Striga. Fifteen cultivars were used with IT82E-32 and KVx 396-18-10 included as susceptible checks. Striga was observed on the susceptible checks.

- . Preliminary yield trial: It consisted of sets of trials in which lines were derived from crosses of B 301 and best local sources of Striga resistance and lines combining Striga, bruchids and aphids resistance.

- . Advanced yield trial: Ten promising cultivars for Striga resistance were tested. The cultivars were from Burkina, IITA/SAFGRAD, Niger and Senegal.
- . F₂ population: The population was derived from 17 crosses made in November/December 1989 with the objective of incorporating aphids, bruchids, Striga and scab resistance into KVx 396.
- . Intercropping cowpea with cereals: Eight cowpea cultivars were being evaluated in a sorghum based cropping system.

b) Cowpea agronomy/physiology

- . Intercropping cowpea/sorghum: Three cowpea cultivars were intercropped with sorghum using 2 rows of sorghum, 1 row of cowpea. The inter-row spacing was 75 cm. There were three cowpea densities with intra-row spacings of 20, 60, and 100 cm, respectively.
- . Seedbed preparation/water management: The treatments included a factorial combination of four varieties, three seedbed preparation methods. It was observed that KVx 396-4-4 and the local cultivar were performing well on the flat. In general, the crop performed better on tied ridges compared with the flat.

c) Cowpea entomology

- . Insecticide evaluation: Nine insecticides and a control were being tested. A local insecticide derived from extracts of roots of neem tree was included.

- . Population density studies: The effect of cowpea density on the population and dynamics of insects was evaluated. Three spacings (20 x 75 cm, 100 x 150 cm, 100 x 225 cm) were tested using three cowpea cultivars. It was felt that since cowpea is mainly grown under intercropping conditions the trial should have been conducted under both pure and intercropping combinations.

d) Cowpea pathology

- . Resistance to web blight: Several cultivars from IITA were screened on a sick plot. The trial was conducted in collaboration with the IITA cowpea pathologist.
- . Fungicide evaluation: A combination of 12 fungicides and 3 cowpea cultivars were tested. The major cowpea disease in that zone is brown blotch (Colletotrichum capsici).

e) Cowpea virology

- . Resistance to Aphid Borne Mosaic Virus: Fifteen best cultivars out of the cultivars previously evaluated in the greenhouse were evaluated in the field.

5) Field Visit at Farako-Bâ

Farako-Bâ is in the northern Guinea savanna with an annual rainfall of 900-1200 mm. The main constraints to cowpea production in the area are high insect pests and disease pressure.

a) Cowpea breeding

The experiments were similar to those conducted at Pobe and Kamboinse and included:

- Advanced yield trial
- Preliminary yield trial
- F₄ population (evaluation)
- Evaluation of lines of various origins (Burkina, INRAN (Niger), IITA-ICRISAT (Niger)).

b) Cowpea pathology

- . Yield losses due to brown blotch and scab: Three cowpea cultivars (KVu 69, KVx 396-4-4, KVx 61-1) were compared. Spreader rows comprising susceptible cultivar were sown three weeks before sowing the test cultivars. There were fungicide sprayed and unsprayed plots.
 - . Resistance to web blight: Several lines were screened in the field for resistance to web blight. The lines IT87S-1394, IAR 48 (Sampea 7), TVu 530 and TVu 2027 were found to be moderately resistant.
- 6) Visit to "Centre Regional de Promotion Agro-pastorale" at Bobo-Dioulasso

The participants were briefed on the activities of the Center by Mr Sanou André, chief of the extension and training unit. The center collaborates with agricultural research in testing promising technologies and extending them to farmers. Through this collaboration, the variety KN-1 has been recommended to farmers. Other varieties are being proposed: KVx 396-18-10, KVx 396-4-5, TVx 3236. The center is conducting an on-farm trial at Dande and Kourouma.

7) Visit to "Institut Burkinabè d'Énergie" at Ouagadougou

The participants had the opportunity to visit technologies developed by the Institute. These included:

- Solar drying facilities which can raise the temperature to 60-70°C.
- Onion storage facility.
- Biogas device which produces gas for home use and fertilizer for the field.
- Improved stove facility.

Participants were very impressed with the activities and achievements of the Institute.

8) Conclusion

The cowpea research activities being conducted in Burkina Faso is quite impressive. The program is able to cover the three main ecological zones where cowpea is grown. The participants felt that there is a need of having a fulltime agronomist in the program.

VISIT TO NIGER

The tour in Niger took place from 2 - 6 September 1990.

1) Courtesy Call and Interaction with National Scientists

Director General of INRAN: The Director General of "Institut National de la Recherche Agronomique du Niger" (INRAN) Mr. S. Bawa welcomed participants to Niger. He emphasized the importance of cowpea as food crop (coming next to millet) and as cash crop (coming next to groundnut) in Niger. He commended the efforts RENACO is making to overcome cowpea constraints in the region. According to him, if chemical control of insect pests is very effective, it should not be the only way of controlling insects. Alternatives should be found due to the danger of chemicals. He mentioned that he would make every effort to help Niger's cowpea program to fully participate in the RENACO activities since Niger is one of the lead centres.

Interaction with cowpea scientists: Mr. Adamou Moutari, the national cowpea coordinator introduced the cowpea research team and presented an overview of the national cowpea program. Research activities are carried out at different locations: Kollo, Ouallam, Gabagoura and Maradi. The cowpea research team include breeders (2); pathologist (1); entomologist (1), agronomist (1). Scientists from University of Niamey also participate in cowpea research activities.

The main cowpea production constraints in Niger are: drought, high temperatures, diseases (bacterial blight and macrophomina) insects and Striga. The best varieties identified so far are: TN88-63, TN5-78, TN27-80, KVx 100-2 and KVX 30-309-6-G.

2) Field Visits to Gabagoura

Gabagoura is located in Niamey area where the annual rainfall is about 500 mm.

a) Cowpea breeding:

- . Screening for Striga resistance: Lines derived from crosses involving B 301 were being screened. Striga was observed in some B 301 plants.
- . Regional Adaptation trial: Most of the varieties were infested with Striga. Varieties TN27-80 and A18-1-1 were performing well in the region.
- . Variety mixture: Mixture of varieties were tested in pure stand and in intercropping with millet.
- . Fa population evaluation: Lines derived from crosses of TN-88-63 with IT81D-994 were tested.

b) Cowpea pathology

- . Screening for resistance to macrophomina: Twenty one varieties are being tested. Variety IT81D-994 appeared to be tolerant to the disease.

c) Cowpea agronomy

- . Intercropping cowpea with millet

3) Field Visit to Kollo

Kollo is also located in Niamey area where the annual rainfall is about 500 mm.

a) Cowpea breeding

- . Screening for bacterial blight resistance:
- . Regional adaptation trial
Varieties TN87-80 and KVx 396-4-5 were performing well.
- . Collaborative varietal trial (IITA-Sadore-INRAN).
Varieties ITN89E-4 and ITN89E-3 were among the best.
- . Evaluation of local cultivars

Twenty local cultivars, collected in 1987, were being evaluated. The cultivars 87N-41A and 87N-28 were vigorous and free of diseases.

b) Cowpea Entomology

- . Screening for resistance to flower thrips.
- . Evaluation of insect damage on cowpea in a cowpea/millet intercropping system. Both trials were conducted under no insecticide application.

c) Cowpea agronomy

- . Intercropping cowpea with millet

4) Field Visit to ICRISAT Sahelian Center at Sadore

Sadore, located 40 km from Niamey, is the headquarters of the ICRISAT Sahelian Center where the annual rainfall is about 500 mm.

a) cowpea breeding

Most of the activities are concentrated in breeding. Several crosses have been made to develop cultivars resistant to:

High temperatures, insect pests, diseases (bacterial blight and macrohomina) and Striga, and adapted to intercropping system. Segregating populations were being evaluated F2- F6. An important Striga study is underway to determine the inheritance of Striga resistance in cultivar B 301. Other research activities consisted of :

- . Screening local cultivars for aphid resistance.

- . Collaborative trials with INRAN on screening for resistance to macrohomina.

According to Dr. B. N'tare, the IITA Sahelian Program is going to be terminated sometime this year in 1990.

5) Field Visit to Ouallam

Ouallam is located 100 km north of Niamey where the annual rainfall is about 300 mm. Following activities were being carried out:

- . Evaluation of local cultivars: 87N-88 appeared to be well adapted;

- . Collaborative trials (IITA-INRAN)

- . Regional adaptation trial

IT85D-3516-2, TN27-80, KVx 396-4-5 were performing well. The trial on millet/cowpea intercropping was a failure. Only due to lack of rain, cowpea survived.

6) Visit to The University of Niamey

In collaboration with INRAN, a cowpea pathologist, Dr. A. Toudou, at the University of Niamey, is screening cowpea for resistance to macrohomina. Twenty one varieties were tested, each on a two row plot; with 1 row inoculated with the pathogen and the other not inoculated.

7) Visit to Maradi

Maradi is located at 660 km south east of Niamey where the annual rainfall is about 600 mm.

a) Cowpea breeding

- . Evaluation of advanced generations: F₂ to F₅ populations of various crosses were being evaluated. The selection is made on the bases of large adaptation, dual purpose (grain and fodder), growth habit and grain quality.
- . Preliminary yield trials: F₅ populations were being evaluated in preliminary yield trials.
- . Collaborative trial (IITA-INRAN): Varieties like ITN87E-1419, ITN89E-7, KC 85-7, 621-1 and ITN87E-3 were the most productive and resistant to diseases.
- . Evaluation of local cultivars: Cultivars 87N-41A, 87N-12A, and 87N127 were performing well.

b) Cowpea agronomy

- . Incropping cowpea with millet: Spatial arrangement, cowpea plant densities, number and weeding frequency were studied.

c) Cowpea entomology

- . Evaluation of insecticides:
- . Evaluation of insect damage on cowpea
- . Evaluation of lines for bruchid resistance

d) Cowpea pathology

- . Striga resistance trial: Among the 24 varieties tested, 3 varieties TN5-78, TN93-80, TN121-80 were resistant.
- . Screening for resistance to Striga: Lines derived from crosses of resistant parents and TN88-63 were being screened.
- . Effect of plant density on Striga damage
- . Effect of cowpea/millet intercropping on Striga.

8) Conclusion

A great improvement was observed in the activities of Niger's cowpea program as a Lead Center of RENACO. It was observed that research leaders are well aware of the importance of cowpea in Niger's economy and are decided to put all efforts to strengthen the research capability of the cowpea program. Participants noticed with satisfaction the multidisciplinary approach used by Niger scientists. Participants were concerned about the termination of the IITA-SADORE cowpea program as this might weaken the Niger's program as a Lead Center.

VISIT TO NIGERIA

Nigeria was visited from 7-13 September 1990. Three ecological zones were visited: northern Guinea savanna, sudan savanna and the rain forest. The main constraints to cowpea production in these areas are insect pests (thrips, Maruca, pod sucking bugs), diseases (bacterial blight, scab, brown blotch, macrophomina), heat, drought and parasitic weeds (Striga and Alectra).

1) Courtesy Calls and Interaction with National Scientists

- . Director of IAR: The Director of the Institute for Agricultural Research (IAR), Dr. J.Y. Yayock, welcomed participants to Samaru. He briefed them about the background and objectives of IAR.
- . Interaction with scientists: The participants interacted with cowpea scientists while visiting the three ecological zones.

2) Field Visits to Samaru/Zaria

a) Cowpea breeding

- . Main variety trial:
- . Preliminary yield trial
- . Advanced yield trial

b) Cowpea agronomy

- . SAFGRAD regional variety trial
- . All Nigerian variety trial

It includes short, medium durations, vegetable type and dual purpose cowpea.

c) Cowpea pathology

The experiments involved different methods of screening for resistance to major diseases (brown blotch, scab and bacterial blight).

d) Soil microbiology

- . Two Rhizobium strains isolated from wild cowpeas were tested with cowpea cultivars planted on ridges and in the flat.
- . Response of seed size to phosphorus fertilizer.

e) Weed science

Different types of herbicides were compared for controlling weeds.

f) Seed multiplication

Methodology used to produce breeder's seed for demonstration was highlighted.

g) IITA field plots, Samaru

Various trials were conducted. Among them were 7 preliminary trials and 6 advanced trials.

3) Visit to IAR Field Plots at Minjibir/Kano

a) Cowpea breeding

- . Main variety trial
- . Regional cowpea Striga resistance trial
- . International cowpea Striga resistance trial.
- . SAFGRAD cowpea adaptation trial
- . Observation plot.

b) Cowpea agronomy

- . Millet/cowpea intercropping
- . Millet/dual-purpose-cwpea intercropping

c) Cowpea entomology

- . Screening local cultivars for resistance to pod sucking bugs.
- . Screening of cultivars for resistance to aphids
- . Screening of insecticides
- . Effect of cowpea/pepper intercropping on cowpea insect damage severity
- . Minimum insecticide trial

4) Field Visit to IITA Plots at Minjibir/Kano

a) Cowpea breeding

- . Initial evaluation trials (5)
- . Preliminary trial (8)
- . Advanced trial (7)
- . International trial (9)
- . All Nigerian variety trial (4)

Areas of investigation included cropping systems (i.e. pure-stand cropping and cowpea/millet/sorghum intercropping) and Striga, and Alectra resistance trials.

b) Physiology

- . Basic data collection on cowpea growth, development and yield characteristics.
- . Prediction of flowering in cowpea
- . Cowpea, millet or sorghum interaction study
- . Comparative adaptability of erect and spreading types of cowpea in mixed cropping

Participants also visited the IITA-Kano main office and research supporting facilities at Kano. A meeting, presided by Dr. B.B. Singh, the IITA-Kano Team Leader, was held at the office. During the meeting, issues like the need for an entomologist and a pathologist at the sub-station were raised.

5) Visit to IITA Headquarters at Ibadan

Dr. J.P. Ekebil, Director of IITA International Cooperation Program welcomed participants to Ibadan. He briefed them on the objectives of IITA and informed them about different opportunities available at IITA, which include: graduate student and visiting scientists fellowships.

Dr. S.R. Singh, Director of the Grain Legume Improvement Program (GLIP) presented an overview of the program before Dr. Myers (cowpea breeder) took participants to visit cowpea research facilities (i.e. Genetic Resource Unit, Virology, Biotechnology, Entomology, pathology laboratories and screenhouses and field plots for cowpea breeding). The field research activities were as follows:

- . International trials (9)
- . All Nigerian trials (5)
- . Mutation breeding
- . Entomology
- . Seed multiplication
- . Characterization of wild cowpea

6) Conclusion

Participants were impressed with the cowpea research activities in Nigeria. Participants noticed with satisfaction the important role played by some key scientists for the success of the visit in Nigeria, e.g. Pr. A.M. Emechebe at IAR, Samaru, Dr. B.B. Singh, IITA-Kano sub-station and Dr. S.R. Singh, IITA-Ibadan. It was observed at Minjibir sub-station that there is a need for IITA to employ a pathologist and an entomologist to tackle the cowpea protection problems.

It was recommended that Mr. A. A. Zaria, an IAR cowpea Breeder, be given an opportunity as a visiting scientist, to work with Dr. B.B. Singh for one cropping season in order to gain some experience.

THE 1990 COWPEA MONITORING TOUR
CONCLUSIONS AND RECOMMENDATIONS

During the monitoring tour, participants were able to exchange ideas on cowpea research methodologies with scientists in Burkina Faso, Niger and Nigeria. They were able to see the approaches used by other scientists to tackle problems in cowpea production. Participants were once more convinced of the need of working together in order to strengthen the research capability of the West and Central Africa. In each of the countries visited, participants made some recommendations which are summarized as follows:

1. Burkina Faso: In Burkina Faso, participants felt that there is the need for a fulltime research agronomist in the cowpea improvement program.
2. Niger: In Niger, participants were concerned about the termination of the IITA-Sadore cowpea research program, because this termination might weaken Niger's National program which is a lead center for RENACO. Therefore, they recommended that appropriate measures should be taken.
3. Nigeria: In Nigeria, participants recommended that IITA should employ an entomologist and a pathologist at Minjibir sub-station.
4. Participants further recommended that Mr. A.A. Zaria, cowpea breeder should be given the opportunity to work as a visiting scientist with Dr. B.B. Singh for one cropping season in order to gain some experience.

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- The personal efforts and role played by some key scientists: Prof. A.M. Emechebe of IAR, Samaru, Dr. B.B. Singh, IITA-GLIP, Kano Sub-Station and Dr. S.R. Singh, Director, GLIP, IITA-Ibadan, Nigeria was noted with appreciation.
- Dr. N. Muleba, Cowpea Network Coordinator for his hard work and total devotion to the Network activities.
- IITA for its commitment to the Network and willingness to collaborate with national programs.
- The Governments and people of Burkina Faso, Niger and Nigeria, especially the Directors of Research for making it possible to effect the visit to their respective countries and for their kind hospitality.

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