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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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VISITS TO NATIONAL COWPEA PROGRAMS  
MARCH - OCTOBER, 1991

3236

OCTOBER, 1991

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## EXECUTIVE SUMMARY

Five RENACO National Cowpea Programs were visited by either the Cowpea Network Coordinator, or sometimes accompanied by members of the Cowpea Network Steering Committee. The countries visited were: The Gambia, Ghana, Guinea Bissau, Mali and Niger.

Despite the very limited financial resources in nearly all the countries visited, it was gratifying to note that the most critical cowpea research activities were conducted, particularly in Niger, Mali and Ghana, to some extent. Research activities included: better adaptation and resistance to diseases, major insect pests and *Striga*; validation tests.

Considerable efforts have been made in Guinea Bissau. Taking advantage of the RENACO regional activities, they have propagated the use of new cowpea cultivars in the northern region and extended same to the eastern and southern regions, where cowpea production is not yet very popular.

It was observed, however, that The Gambian National Cowpea Program had fallen short in technology identification and transfer activities as was evident in the inconsistency of the information contained in the RENACO data collection sheets received from the Gambia. Hence no appropriate technology has yet been retained for the benefit of its local farmers. It is therefore, expected that cowpea scientists and all concerned will endeavour to come out of this weakness and provide room for improvement in future research efforts. In particular, efforts should be made to carry out a thorough test throughout the intended ecologies in the country to ascertain farmers reaction to new technologies intended for eventual release. This is necessary to avoid farmers disapproval if such technologies are not properly tuned to meet their needs and requirements.

A recapitulation of the present status of introduced technologies through RENACO regional research efforts of which some of them have either been adopted by farmers and/or scientists for further testing is as follows in countries visited in 1991.

Gambia

- . Seed multiplication for further on-farm testing: Cultivars IT83S-728-13 and IT84S-2049;
- . Minimum insecticide protection: two treatments at critical growth stage is being further verified by the Farming Systems Unit (FSU).
- . Cereal-cowpea mixed croppings: being tested by the FSU.

Ghana

- . Varieties released since 1987: (IT82E-16), known locally as "Vallenga".
- . Varieties being considered for release: IT81D-1137 and IT83S-818.
- . Varieties accepted by breeder for further testing: KVx396-18, KVx396-4-2, KVx396-4-4, KVx396-4-5 and KVx30-305-3G
- . Minimum insecticide protection: being tested.
- . Cereal cowpea mixed cropping: being tested.

Guinea Bissau

- . Varieties released since 1987: IT82E-9, IT83S-889
- . Seed increase for further testing: IT86D-3516-2, IT87S-1390, KVx30-309-6G, IT86D-373, IS87-416N
- . On-farm testing. IT83S-889, IT87S-1390, IT86D-489, KVx30-309-6G, KN-1, Bambey 21, IS87-416N, IS86-275N and Mougne.

Mali

- . Released cultivar: SUVITA-2
- . Foundation seed multiplication: SUVITA-2, KVx30-309-6G, KVx61-1, Dan Illa and TVx3236.

Niger

- . Cultivars introduced either from IITA or RENACO and have been accepted by breeders for further testing: IT85S-265-72, ITN89E-3, ITN89E-4, KVx30-309-6G, KVx30-305-3G, KVx100-2 and KVx396-4-5.

**VISITS TO NATIONAL COWPEA PROGRAMS**  
**MARCH - OCTOBER, 1991**

**I. INTRODUCTION**

As a yearly activity, the Network Coordinator and some selected scientists of the West and Central Africa Cowpea Collaborative Research Network (RENACO) pay visits to national programs. The objectives of the visits are to get acquainted with cowpea production and research constraints, monitor cowpea research activities conducted towards solving production constraints, identify new research methodologies and new technologies for their dissemination within the sub-region and finally, to measure progress made by individual countries in new technology identification and transfer to farmers.

Visits effected in 1991 to national programs in accordance with decision No.4 of the 9th Meeting of the RENACO Steering Committee held at Niamey, Niger from 13-14 March, 1991 are as follows:

<u>Country</u>	<u>Date</u>	<u>RENACO Official</u>
The Gambia	2-4 October 1991	Network Coordinator
Ghana (Kumasi)	25-27 March, 1991	- do -
Ghana (Nyankpala)	18-22 August, 1991	Dr (Mrs.) C. Dabire & Network Coordinator
Guinea Bissau	27 Sept.-2 Oct. 1991	Network Coordinator
Mali	28-31 May 1991	- do -
Mali	17-20 September 1991	- do -
Niger	4-10 August, 1991	Network Coordinator & Dr. O.O. Olufajo, Chairman of the RENACO Steering Committee, Nigeria.

We very much regret that planned visits to other countries, namely, Benin, Cameroon, Guinea Conakry, Mauritania and Tchad could not be honoured due to unforeseen budget limitations.

**THE GAMBIA**

(October 2-4, 1991)

## 1) Introduction

Gambia is a technology adapting center within the Cowpea Network (RENACO). Dr. T. Jallow, a Gambian scientist, had been a member of the Cowpea Network Steering Committee from November 1987 to November 1988. Scientists from The Gambia had also participated at all the Cowpea Workshops organised since 1987 and to the 1990 cowpea monitoring tour to Burkina Faso, Niger and Nigeria, including IITA-Ibadan. The national cowpea program was visited by Dr. O.O. Olufajo, member of the Cowpea Steering Committee, in September/October 1990.

The following regional trials were requested by and supplied to Gambia as below:

### a) IITA-Ibadan (1987)

- . Early maturing cowpea cultivars;
- . Medium maturing cowpea cultivars;

### b) RENACO (1987)

- . Sorghum-cowpea intercropping;
- . Millet-cowpea intercropping;
- . Cowpea minimum insecticide protection;

### 1989

- . Regional adaptation trial for northern Guinea savanna.

### 1991

- . Regional adaptation trial for northern Guinea savanna.

Feedback was received by the Coordinator only for the 1989 regional trials. It should be noted however, that it was a bit too early to expect feedback from the 1991 trials at the time of this visit.

## 2) Purpose of visit

The purpose of the visit of the RENACO Coordinator to the Gambia was to monitor cowpea research activities in the country and to assess any progress made in new technology identification and transfer to farmers. The visit was concentrated at the West and Central Regions of the country.

### 3) Persons met

The following officials were met at the Yundum Agricultural Experiment Station.

- Mr. M.S. Sompo-Ceesay, Director of the Department of Agricultural Research.
- Mr. Musa Bojang, Cowpea Agronomist and national Coordinator for cowpea research as from November 1988.
- Mr. Kebba Drammeh, cowpea research assistant.

### 4) Cowpea research activities

Owing to limited resources, cowpea research work had been reduced to a minimum in The Gambia. Only RENACO regional trial for adaptation to northern Guinea savanna, seed multiplication and on-farm demonstration for cowpea production were carried out as follows:

#### a) RENACO regional adaptation trial for northern Guinea savannas

The trial was conducted at two locations: Yundum in the Western and Somita in the Central Regions. At Yundum, there was a severe viral disease outbreak. Cultivars IAR-7/180-4-5-1, KVx396-4-5-2D, TVx3236 and CR-06-07 exhibited good level of field resistance to the diseases. Cultivars Mougne and KVx398-7-1 exhibited moderate to high susceptibility to brown blotch disease.

The soil at Somita is very sandy with very low water holding capacity. The trial was hampered by a 7-day dry spell after sowing, thereby affecting stand establishments of the entries. The following entries were observed to have reasonably good stands in all the four replications: IAR7/180-4-5-1, KVx402-5-2, IAR7/180-4-5, KVx 396-4-5-2D.

**b) Seed multiplication**

Seeds of four cultivars: IT84S-2049 and IT83S-728-13, introduced from IITA-Ibadan in 1987; Mougne, from Senegal; and TVx3236 were being increased on fields of about 0.25 hectares each.

**e) On-farm demonstration**

On-farm demonstration of cultivars 58-57 and Diambour from Senegal were carried out all over the country with the view of releasing them to farmers. Both cultivars, especially 58-57 exhibited susceptibility (moderate to high level) to viral diseases in some field plots in the West and Central Regions. It should be pointed out however, that even though both cultivars are commercially produced in Senegal, there was no evidence that they were properly introduced and tested for eventual release to farmers in the Gambia. The same thing was noticed for cultivar IT81D-994 which was proposed for release in 1990 but turned out to be late maturing and was rejected by farmers.

**5) Comments****a) Technology development and transfer**

A normal procedure of technology development and transfer entails the following:-

- i) technology evaluation including introduced technology (first year of test).
- ii) preliminary yield trial
- iii) advanced yield trial (also known as multilocation or station variety trials);
- iv) seed multiplication
- v) on-farm demonstration and finally,
- vi) release of the technology.

This is to say that the germplasm introduced in The Gambia in 1987, following this procedure would have been getting to the seed multiplication stage by 1991 and should have been in preparation to go for on-farm testing. However, in the absence of Gambia's national cowpea research progress reports for both 1989 and 1990, I cannot ascertain the present status of this research effort. The same thing applies to the 1989 introduced germplasm through regional trials. It should be noted that none of the germplasm introduced in 1989 was seen either on the field or in the store house during this visit. But surprisingly, good remarks were noted on the data feedback information sheet of the RENACO regional trial for adaptation to northern Guinea savanna received from The Gambia in 1989/90.

One is tempted to think that the absence of preliminary and advanced yield trials in 1991 from The Gambia may be the reaction for the inconsistency of its technology identification activities and transfer. It was, therefore, not surprising that cultivars CB-5 in 1988, IT81D-994 in 1990 and 58-57 and Diambour in 1991 were being considered for release at a time when there were better performing and disease resistant cultivars replacing them even in neighboring Senegal.

#### b) Other technologies

Variety, minimum insecticide and cereal-cowpea intercropping regional trials sent by RENACO in 1987 were conducted (Ref. Department of Agriculture, Agricultural Research Services Annual Reports, 1987 and 1988). This new line of research activity is being pursued by the farming systems research unit in the promotion of cowpea production throughout the country.

#### 6) Conclusion

In the absence of the 1989 and 1990 annual progress reports, it was not possible to measure the progress made in cowpea technology development and transfer in The Gambia since 1987. It was however, gratifying to note that two cultivars, IT83S-728-13 and IT84S-2049 introduced from IITA in 1987 were found to be promising in the 1987 and 1988 trials and were at the seed

multiplication stage. On the other hand, it was disheartening to note that certain cultivars that were purported to have been of outstanding performance with good seed quality in the 1989 regional trials could not even be traced in the germplasm seed store in 1991, let alone in the field. One other point observed was the pre-matured and inadequate testing of certain cultivars in the country before attempting to release them. It is hoped that the responsible authorities in-charge of research will be influential in discouraging these sort of practices, if we have to meet our research goals throughout the West and Central African region effectively.

**GHANA (KUMASI)**

Eleventh National Maize and Legumes Workshop

**(March 25-27, 1991)**

### 1) Introduction

On the invitation of the Organizing Committee, The Coordinator of RENACO attended the above mentioned Workshop.

Ghana is a member country of RENACO since its inception in March 1987. Cowpea research activities are carried out by two major research stations under a bilateral agreement of the Canadian International Development Agency (CIDA) based in Kumasi for the humid zone and GTZ, Germany, based at Nyankpala for the Northern Guinea savanna zone. A yearly maize-cowpea Workshop of national scientists is held under the sponsorship of CIDA in Kumasi to discuss their research findings, production constraints and how to go about solving them. The Maize and Cowpea Networks Coordinators of SAFGRAD seized this opportunity to interact with national scientists on various aspects of research activities which they found to be helpful in their individual roles as researchers.

### 2) Objectives of the Workshop

As a yearly practice, the major objective of the Workshop was to pool maize and cowpea scientists together with extension workers, local farmers, agricultural input suppliers (including credit facility), bank managers, traders in agricultural products, food processing agencies and decision makers to discuss maize-cowpea research findings, production constraints (including problems of marketing, etc) and to review research work plans for the 1991 growing season.

### 3) The Workshop

#### a) Attendance

Over 600 scientists, scholars, extension workers, progressive farmers, agricultural input suppliers, transport owners and traders as well as food processing agencies and decision makers were in attendance. The Guests of honour included the Peoples National Defense Council (PNDC) Secretaries for

Ashanti Region, for Industries, science and Technology and for Agriculture and the Canadian High Commissioner to Ghana, His Excellency C.D. Fogerty.

b) Organization

The Workshop was held from 25-27 March, 1991 at the Kumasi Technical Institute. It was divided into five parts as follows:

- Release of a new maize cultivar "Abeleehi", developed by the Ghana Grain Development Project.
- Report of maize, cowpea and associated crops research findings, including on-farm testings and adoption problems;
- Problems encountered in meeting the extension needs of farmers, including women and children as equal partners of men in agricultural production in Ghana;
- Discussions of Workplans for maize and cowpea research, on-farm testing and training and communication for the 1991 crop season;
- Forum on agro-chemicals.

c) Observations

The Ghana maize-cowpea workshop appears to be a unique one, at least in West and Central Africa, as it provides a forum for all essential functions (education/extension, research, production, supplies, marketing and governance) to interact among themselves for a harmonious agricultural and economic development. That was exactly the case during the Workshop as was seen by the various themes discussed as per attached program.

The Workshop was geared towards strengthening the link between agricultural research and extension workers, farmers and decision makers.

The PNDC Secretary for Industries, Science and Technology announced to participants of his plans to restructure agricultural research in Ghana including the provision of a budget to cover the total cost of maize-cowpea research at the end of the last phase of CIDA's financement.

Protein quality maize including the use of crops with high lysine and tryptophane contents (such as cowpea and soybean) were discussed as means of improving human food quality.

Cowpea research included breeding, entomology and agronomic research as well as studies of rainfall characteristics for the transition zones. On cowpea entomology and breeding research, we noted the screening of local cowpea for insect pests resistance. A few cultivars were promising for field resistance to aphids, thrips and pod borers, but are yet to be confirmed in the Screenhouse. On agronomic research, we noted phosphorus nutrient studies, on-farm testing of varieties as well as fertilizer and soil water management (i.e. ridges, flat, mounds, etc).

Adoption studies conducted in Northern Ghana for cowpea showed following results for two cowpea cultivars.

<u>Cultivar</u>	<u>Adoption frequency</u>
. Valenga (IT82E-16)	38%
. Black eye	18%
. Other varieties	42%

The overall acreage grown to new improved cultivars represented 34% of the total cowpea acreage.

Although considerable efforts have been made on on-farm testing, we observed that with the exception of yield stability analysis studies conducted on cowpea in northern Ghana, many other on-farm yield testings did not show statistical analysis. If there were any at all, varieties were ranked the same way at all test locations (i.e. there was no significant interaction between locations x varieties). Similarly, on-farm fertilizer

testings conducted at several locations did not show significant differences due to N fertilizer sources or levels; soil tests were not shown.

We felt that soil tests, preceeding crop treatments (fallow, crop rotations, continuous cropping, etc) and meteorological conditions (rainfall) at testing site should have been briefly highlighted. Perhaps the credibility of the results could have been ratified, if senior scientists in-charge of on-farm testing visited a few locations from time to time during the crop season to ascertain the accuracy of the results (reweighing the harvest of some fields, etc.).

#### 4) Conclusion

In spite of these few lapses, which we believe can be corrected through in-service training, the Ghana maize-cowpea research is on a firm footing. The yearly national maize and legumes workshop, offers an opportunity to scientists, and other agricultural development sectors and decision makers to interact positively towards a sound agricultural development.

We hope that other national programs of RENACO will have the opportunity to see and adopt the good example set by Ghana for sustainable agricultural productivity and production.

**GHANA (NYANKPALA)**

**(August 18-22, 1991)**

## 1) Introduction

The national Cowpea Research Program of Ghana is one of the six Lead Centers for Cowpea Research. The responsibilities assigned by RENACO to Ghana are as follows:

- Varietal selection for adaptation to transition zones.
- Entomology
- Validation research for *Striga* resistance, especially in the Sudan savanna zone.

Cowpea storage responsibility was entrusted to the national cowpea program of Cameroon and was handled by Georges N'toukam, an entomologist at the Agronomic Research Institute in collaboration with Purdue University, a cowpea storage project financed by the Bean/Cowpea Collaborative Research Support Program (CRSP). The project was based at Maroua in the Sudan savanna zone. Due to the departure of Mr. N'toukam for higher degree course in the USA, RENACO was concerned about the possible continuation of this important activity since the coordination of cowpea research was going to be taken over by a cowpea agronomist. Ghana, therefore, proposed itself to take over this activity from Cameroon.

In this regard, the Cowpea Steering Committee felt the need to delegate an entomologist and the Cowpea Network Coordinator to examine the situation in the two countries and come out with suggestions as to:

- 1) Whether or not, Cameroon should continue work on cowpea storage.
- 2) The possibility and capacity of Ghana to undertake work on this program in the Sudan savanna zone.

## 2) Objectives of the visit to Ghana

The objectives of the visit to Ghana were to:

- Evaluate the capacity of existing current research work on cowpea storage.
- See if cowpea storage work is of interest and a priority for Ghana.

The Cowpea Network Coordinator was to take that opportunity to inspect the overall cowpea research activities in northern, upper west and upper east regions of Ghana, especially in cowpea validation research for *Striga* resistance. This will enable him to have an idea of the volume and the quality of cowpea research in the Guinea and Sudan savannas of Ghana.

### Participants

- Dr. C. Dabire, Cowpea entomologist, Burkina Faso and member of RENACO Steering Committee.
- Dr. N. Muleba, RENACO Coordinator.
- Mr. Issa Cisse, driver.

### Persons met in Ghana

- Mr. H.M. Quarshie, Director, Nyankpala Agric. Research Station.
- Dr. K.O. Marfo, Cowpea Breeder in-charge of the northern region.
- Dr. A.B. Salifu, grain legume and cotton entomologist in-charge of northern region.
- Dr. W. Florisch, German GTZ millet agronomist and acting GTZ team leader for the savanna zone of Ghana.
- All heads of crop commodity research programs based at Nyankpala.

### Field Visits

We started the field visits from Nyankpala on 19 August and ended on August 22nd at Navrongo, near the Ghana-Burkina border. The following research stations and sub-stations: Nyankpala and Manga and on-farm testing sites; Tamale, Kongo village, near Bolgatanga and a village around Navrongo were visited. Ghana's cowpea research activities in the northern savanna zone included: cowpea breeding, entomology, agronomy and farming systems research.

#### i) Production constraints

- . Excess moisture: Due to the long cropping season, beginning end of April-early May and ending somewhere in October, cowpea suffer from excess moisture conditions. Cowpea grown in May or June matures in July, August or early September and therefore is exposed to pod and seed rot due to protracted rainfall. On the other hand, cowpea sown in mid-July may be exposed to high soil water saturation and can slow down cowpea growth. However, a proper choice of cowpea variety and appropriate planting time can improve not only cowpea production but also the grain quality.
- . *Striga gesnerioides* is a severe handicap to cowpea crop in the Northern and upper regions, particularly in the Sudan savanna along the Bolgatanga-Bawku axis and Navrongo. The possibility of the same damages by *striga gesnerioides* in the southern Guinea savanna cannot be excluded.

We observed three kinds of *striga gesnerioides*: pink, and white flower type with all green vegetative plant part and purple including its flowers and vegetative plant part type, parasitizing wild legumes at the Nyankpala station.

## ii) Cowpea breeding

Cowpea breeding work was conducted at four stations and sub-stations in northern Ghana, namely Nyankpala, Manga, Damongo and Wa. It was comprised of variety trials of local and introduced varieties and cultivars with a little bit of varietal crosses for generating new cultivars.

Trials conducted were as follows:

### a) Nyankpala station

**Local germplasm:** Thirty landraces collected in northern Ghana and 54 local varieties introduced from the Bonsu Station were being grown for seed increase. They will, subsequently, be evaluated by a cowpea breeder and an entomologist for possible insect pest resistance and other desirable attributes.

**Preliminary yield test of heat tolerant lines:** Eighty-one F5 to F7 lines extracted from crosses of local varieties, Sumbrizola and Sumbrizie and cultivar Vallenga (IT82E-16) with heat tolerant parents: 518-2 (CB5 x Prima) x TVu 7977 and 148-1 (CB5 x TVu 4552) x CB5 were being evaluated for yield performance and other desirable attributes.

**IITA early maturing cultivar trial**

**IITA medium maturing cultivar trial**

**IITA late maturing cultivar trial**

**IITA virus resistance trial**

**RENACO 1991-92 adaptation trial for transition zones**

It is expected that the most promising entries from these trials will be tested at Nyankpala and Damongo stations in the northern Guinea savanna, Manga and Wa in the Sudan savanna.

**Station variety trials:** The 1991 station variety trials were made up of three groups:

- Early maturing cultivars: Entries from IITA-Ibadan, IT86D-396, IT86D-1010, IT85F-2020, IT86D-792, IT85F-2120, IT86D-400, IT86D-440) compared to (IT83S-720xSubringrela), IT84S-2246, Vallenga (IT82E-16) and IT83S-818.
- Medium maturing cultivars: Entries from IITA Ibadan (IT84S-2118, IT87S-1462, IT85D-3577, IT86D-535, IT86D-719, IT86D-843, IT85F x 2264, IT82D-669, IT84D-641), tested against (IT85D-3850-1 x Sumbrizie), (IT85D-3550-2 x Sumbrizie) and Subringrela.
- Late maturing cultivars: Entries from IITA-SAFGRAD prior to 1987 (KVx 65-114, KVx 183-1, KVx 250-K57-118, KN-1), from RENACO after 1987 (KVx 396-18, KVx 396-4-2, KVx 396-4-4, KVx 396-4-5, KVx 30-309-3G) and from IITA Ibadan (IT86D-1056 and IT81D-1137) were tested against a local variety, Sawla.
- Although virus incidence was negligible at Nyankpala in 1991, some cultivars and varieties exhibited medium to high level of susceptibility to viral diseases. They included: (IT83S-720 x Sumbrizie), IT83S-818, IT87S-1462, Sawla, IT86D-444, IT82E-18, KVx 250-K57-118, IT81D-1137.
- Excess moisture can result in poor seed germination. Cultivar IT86D-1010 was not at all adapted to excess moisture conditions.

b) Manga sub-station

This sub-station is located in the north-eastern part of Ghana in the Sudan savanna, near the Ghana-Burkina-Togo borders. *Striga gesnerioides* was found to be severe in some field plots. In addition to the three variety trials conducted at Nyankpala, a RENACO *Striga* resistant trial was tested in a *Striga* sick plot. The crop was podding at the time of our visit.

Results of *Striga* resistant trials were in this order.

- . *Striga* resistant cultivars: IT82D-849, IT81D-994, B301 and KVx 402-19-1.
- . High level of resistance to *Striga*: KVx 397-6-6, KVx409-19-5.
- . *Striga* susceptible:IT82E-32.

Other entries had medium to high level of resistance to *Striga*. Since it is possible that F9 lines could have been still be segregating for *Striga* susceptibility, their resistance can be increased by single plant selection and screening them in *Striga* sick plots. Web blight, brown blotch and leaf smut diseases were observed in some cowpea entries at this same station. These diseases can be detrimental to cowpea crop in rainy years.

### 3) Cowpea entomology

#### Insecticide screening trial

Seven insecticides were tested:

- Dimethoate
- Dursban
- Lambda cyhalothrin
- Endosulfan
- Bacillus thuringensis
- Cypermethrine + diazinon
- Cypermethrine

No insecticide spray for the local check.

Two entomologists: a cereal entomologist, Dr. P.B. Tanzubil, and a cotton and grain legume (cowpea, groundnut, soybean, peageon pea and bambara-nut) entomologist, Dr. A.B. Salifu, work at the Nyankpala Station. An entomology lab has just been constructed and is expected to be operational in 1992. Cowpea entomology studies are carried out mainly at the Nyankpala station. Trials consisted of insecticide screening and application regimes. Cereal-cowpea intercropping studies were also being conducted with the cowpea entomologist taking care of

cowpea insect problems under such cropping system. Plans are also underway to studying plant host resistance. To this effect, 30 cowpea varieties collected in northern Ghana and 54 varieties introduced from the Bonsu Station were being grown for seed increase. The materials shall be screened with entries introduced from Burkina Faso for insect resistance.

Two entomology trials were visited.

- 1) Insecticide screening experiment: Seven insecticides were studied.
- 2) Minimum insecticide trial: Part of RENACO Entomology regional trial. Two insecticide treatments were tested on two cowpea cultivars: IT81D-1137 and IT83S-818 as follows.
  - No insecticide spray
  - Two sprays: at pre-flowering and the second at flowering.
  - Three sprays: at pre-flowering, the second at flowering and the third at podding.

Previous years' results of the same experiment have shown two sprays to be sufficient enough for a good cowpea yield. However, a third spray appeared to be crucial for seed quality in northern Ghana.

The trial appeared to be a bit different from the RENACO minimum insecticide trial as follows:

- . Two cowpea varieties tested included a local variety (farmer's variety) and an improved cultivar, IT84S-2246, (the two varieties used in Ghana were all improved cultivars IT81D-1137 and IT83S-818).
- . Two insecticide treatments: (1) no insecticide spray and (2) two insecticide sprays at flower bud formation (not at pre-flowering stage) and at podding (pods well visible on more than 50% of the plants).

#### 4) Cowpea Agronomy

Cowpea agronomic studies included grain legume cereal intercropping and rotation studies conducted both in station and on-farm. These studies were intended to establish good soil conservation, soil fertility maintenance and/or improvement and control of soil borne diseases including *Striga*. On-station studies have shown cowpea, groundnuts, root crops and soybean to be the best preceding crops for maize. On-farm testing, particularly in *Striga* sick plots had just begun in the 1991 crop season.

##### On-farm visits

On-farm testing, demonstration and farmers cowpea production farms in villages around Tamale, Bolgatanga and Navrongo were visited. Modern cowpea production, especially as a pure stand is gaining wide spread in Ghana because of the Global 2000 project financed by a Japanese Company; Sasakawa. The project provides credit facilities for modern production of pure-stand maize crop in Ghana. Since cowpea is a good precedent crop to maize in rotation or a companion crop and also has a high market value, it also benefits from the credit facility scheme from the Global 2000 or the national cotton production projects.

A semi-erect cowpea cultivar, IT82E-16 introduced from IITA, Ibadan has been released in northern Ghana known locally as Vallenga. Two other cultivars, IT81D-1137 and IT83S-818 were being considered for release. Although susceptible to the prevailing viral disease, their yield potential is very good, especially when they are sown early in the crop season (May-June).

*striga gesnerioides* causes serious damage to cowpea crop in certain villages, such as Kongo, about 10 km east of Bolgatanga in the Sudan savanna zone. Not only cowpea farms does it parasitize, but also wild legumes. The potential of *Striga* destruction on cowpea is alarming even in the southern and northern Guinea savannas.

We found three strains of *Striga gesnerioides* species (two green foliage with pink and white flowers and a purple foliage with purple flowers) at Nyankpala near the tennis court. The different species had parasitized on wild legumes. A single mutation is enough to spread cowpea *Striga* throughout the regions.

### Conclusion

A Ghana Cowpea Improvement Program for the savanna regions had just been initiated. Efforts should be made to improve interaction among cowpea breeding, agronomy, entomology, pathology and any other discipline in order to overcome cowpea production constraints effectively. It is suggested that new cowpea cultivars intended for release in these regions be tested thoroughly for *Striga* resistance or tolerance. Only *Striga* resistant/tolerant cultivars should be released in order to limit *Striga* damage in farmers' fields. Perhaps Burkina and Ghana can establish a collaborative research program for *Striga* resistance using the research stations of Fada and Manga (Bawku).

With regards to the objectives of the visit on cowpea storage, the following were our findings:

- 1) Resident research on cowpea storage at Nyankpala has not yet begun. The entomologist has it in mind to establish this program in addition to his responsibilities on cowpea, groundnuts, pigeon peas, bambaranuts and cotton. We did not also see signs of breeding work intended for bruchids resistance in Ghana's program.
- 2) Infrastructure and research facilities. A new laboratory is being completed and will offer the possibility of carrying out a number of activities in it, but it has been specifically built for cotton work. We did not see any structures, such as barns, etc.. intended for cowpea storage.

The new laboratory can probably be useful for bruchids studies, but the entomologist informed us that he did not have the necessary equipment (plastic tins...) to commence such a work right now. Financial support was equally a limiting factor and he hoped that SAFGRAD is able to offer him a helping hand in this respect.

C. DABIRE & N. MULEBA  
OCTOBER, 1991, OUAGADOUGOU

**GUINEA BISSAU**

**(September 27th-October 2nd, 1991)**

## 1) Introduction

Guinea Bissau, like Angola, Mozambique, Cape Verde, Sao Tome and Principe were among the latest countries to attain independence in the African Continent since colonization in the sixteenth century by the Portuguese until the mid-70's. Food crop research in Guinea Bissau did not exist until recently in the mid 70's. Hence young scientists under 35 years are holding agricultural research responsibility in this country. Agriculture is the major activity in Guinea Bissau and is mainly practiced by peasant farmers. Rice produced from upperlands or irrigation is the staple food. Maize, millet and sorghum are also grown and consumed throughout the country. However, due to the unpredictable nature of the rainfall and distribution pattern, there is no guarantee of adequate production of these food crops. Consequently, the months of August and September are often very critical, not to say famine months for the inhabitants of this country. There is no doubt, therefore, that an early and good yielding crop is searched for to fill in the gap of the lean period while their normal season's crop is due. But even then, drought and other weather hazards often do not guarantee a good yield of the cereal crops.

Due to the erratic, low and poorly distributed rainfall conditions during the last one a half decades, cowpea crop, apparently not very popular or considered to be a minor crop in Guinea Bissau with the exception of the northern strip along the Senegalese border, is now gaining a lot of weight these days with regards to production acreage throughout the country. In fact cowpea grown at the beginning of the crop season in June, especially early cultivars can be harvested and eaten either as green beans in July/August or dry beans in August/September, thereby compensating for the food shortage gap.

Guinea Bissau is a cowpea technology adapting RENACO member country. Its limited resources, i.e. lack of adequate research infrastructure, personnel and financial support, does not permit it to conduct cowpea technology development research activities. Therefore, it relies on technologies developed elsewhere to cater for its cowpea production. One cowpea scientist from Guinea

Bissau was a member of the cowpea network Steering Committee in 1988; he participated at the cowpea monitoring tour to Burkina Faso, Niger and Nigeria, including IITA-Ibadan during the same year, being part of RENACO training activities. However, and most unfortunately, the untimely demise of this scientist, Mr. Malam Sadjo, in January 1989 did not permit the cowpea research program to benefit from the experience gained from the monitoring tour.

Upon request, Guinea Bissau was sent a RENACO regional trial for adaptation to Sudanian and Sahelian zones in 1989. During the Coordinator's visit to Bissau in August, 1989, he discovered that the trial was erroneously conducted in the northern Guinea savanna zone instead of the Sudanian or Sahelian zones.

A cowpea Technician, Abu Biai from Guinea Bissau benefited from a RENACO group training course in Technology Development and Transfer in September, 1989 at Kamboinse, Burkina Faso. Also this country has participated in all RENACO workshops organized so far.

## **2) Purpose of the visit**

The visit by the Cowpea Network Coordinator to Guinea Bissau in 1991 was to monitor cowpea research activities in that country and to see if there has been any progress made under the cowpea network regional activities.

Two cowpea growing areas, Bula in the northern and Kontuboel in the eastern regions were visited.

## **3) Constraints to Cowpea Production**

Guinea Bissau extends from the southern Guinea savanna with over 1500 mm rainfall and about 6 months duration of crop season in the south and the northern Guinea savanna, with 1000-1250 mm rainfall with about 5 1/2 months growing season in the north. The major cowpea production constraints in these two agro-ecological zones are disease caused viruses, fungi and bacteria. Appropriate control measures include: proper choice of varieties and sowing dates.

Dry spells of 8-25 days are frequent at times, either at the beginning or towards the end of the crop season. Therefore, the use of drought resistant cultivars can help minimize severe yield losses during droughty years.

#### 4) Persons met

##### - Bissau

- . Mr. Carlos A. Da Silva, Director General for Agricultural Research, Department of the Ministry of Rural Development.
- . Mrs. I. Miranda, National Coordinator for food crop research.
- . Mr. Domingos Fonseca, Agronomist in-charge of maize and cowpea crop research, based at the Kontuboel Agricultural Experimental Station.

##### - Bula

- . Mr. Quintino Bancessi, Animal scientist, in-charge of Agricultural research in the northern region.
- . Mr. Samhel Balde, Cowpea Field Technician.

##### - Kontuboel

- . The chief of the Station
- . Mr. Abu Biai, Cowpea Field Technician.

#### 5) Technology development and Transfer

Due to limited resources, technology development research work is not done. New technologies from neighboring countries, regional and international organizations are rather introduced. Therefore, technology adaptation research is mostly carried out.

Mr. Domingos Fonseca, an agronomist, is in-charge of two major food crops research: maize and cowpea. He is assisted by a technician (diploma in agriculture) for each crop. Initial research activities are conducted at the main stations involving both crops. The stations are strategically situated to serve the whole country; Kontuboel in the east, Bula in the north and Kabushanke in the south. Promising technologies identified at the stations are subsequently passed on to the Farming Systems

Research Units. Two farming systems units are in operation, one in the south and the other operating in both eastern and northern regions. Multilocation adaptation trials and on-farm verificative or validation tests are carried out under both scientist and farmer managements. Close collaboration and interaction between Farming Systems Units and Extension Workers as well as interested village groups are maintained.

Also, there exist two seed multiplication units at the Kontuboel and Kabushanke experiment stations, respectively. Foundation seed of released cultivars are produced in the stations by the seed multiplication units and eventually supplied in small quantity of about 1-2 kg to seed production farmers. The latter pays just a little more of the quantity of seed received to the former. Seed can also be sold or supplied to other farmers of the neighboring villages.

The technology development and transfer research aspect appears to be very effective. It has contributed to a rapid and smooth transfer of two cultivars, namely IT82E-9 in 1988/89 and IT83D-889 quite recently.

## 6) Field visits

Fields of food crops in the northern and eastern regions were visited. These included both on-station and on-farm testings and demonstration and production farms.

### a) Bula

Bula's station is located in the northern Guinea savanna zone. The long term average rainfall received annually had been 1000-1250 mm until the last 10-15 years when annual precipitations have fallen down to 700-800 mm. The crop season lasts for about 5 1/2 months.

The main research topics at this station are optimum sowing dates and best adapted cultivars. Research activities were as follows:

- i) Sowing date experiment: The experiment included two varieties: IT82E-9 (released) and Pliplolon (local). They were sown at four dates at one month interval, beginning 27 June.
- ii) RENACO regional observation breeding nursery: The nursery was sown in early September. All 14 entries, except IT86D-879 and IT86D-719 exhibited good seedling establishment. There were no late sowings.
- iii) RENACO regional adaptation trial for transition zones: Ten cultivars including a local check were sown in June. A 15-day dry spell was experienced by the trial shortly after sowing. Seedling establishment of all cultivars except IT86D-641, IT86D-444 and IT82E-32 and to some extent, IT82E-16 and IT82E-18 were seriously affected. The above-cited cultivars grew up lavishly in all the four replications.
- iv) On-farm testing: Nine cultivars, of which IT83S-889, IT87S-1390, IT86D-489, KVx30-309-6G and KN-1 introduced from RENACO research efforts; Bambey-21, IS87-416N, IS86-275N and Mougne, introduced from Senegal and a commercially released cultivar IT82E-9 were being tested in farmers' fields under farmers' management.
- v) On-farm cowpea production: Several fields varying from 0.5-2 hectares of pure cowpea crop were visited. I was totally convinced of a wide spread cowpea production effort in the north, with IT82E-9 covering about 40%, followed by IT83S-889 of about 5% of the total cultivated cowpea area.

**b) Kontuboel station**

The Kontuboel station is located in the eastern region of Guinea Bissau. Just as in the north a reduction in average annual rainfall from 1500 to around 1250 mm has been observed in this region in recent times. Unlike the north, where cowpea is a traditional crop, cowpea in the east has only quite recently (1980) gained importance as a food crop due to the frequent weather hazards, resulting to instability in production of their traditional rice, sorghum, millet and maize crops.

Cowpea research topics were the same as at the Bula station although, due to the heavy rainfall in the east, cowpea diseases (viral, pod rot and brown blotch) were serious problems to cowpea production.

Research activities there were as follows:

- i) Sowing date experiment: Two cultivars: IT82E-9 and Pliplolon were being tested at four sowing dates at one month interval, beginning June.
- ii) RENACO regional adaptation trial for northern Guinea savanna: Twelve entries were sown in mid-July, about a month earlier than the optimum sowing date. The cultivars grew, developed and reached maturity under protracted rainfall conditions. This resulted in cowpea disease infection. Susceptible cultivars were:
  - Viral diseases: KVx402-5-2, KVx402-19-1 and KVx305-2-118-23-2.
  - Pod rot: KVx 396-4-5-2D
  - Brown blotch: KVx 398-7-1 and KVx 305-2-118-23-2
- iii) RENACO regional trial for adaptation to transition zones: Ten entries evolved under similar conditions as described in the trial for adaptation to northern Guinea savanna. Disease problems were as follows:
  - + Viral diseases: IT86D-444, IT83S-818.
  - + Bacterial blight: IT82E-18, IT86D-611, IT86D-444
  - + Web blight : IT85D-3577
- iv) Advanced yield trial: The following cultivars were being tested: Bambey-21 and IS87-416N (introduced from Senegal), IT87S-1390, TN88-63, IT86D-713, IT85D-3577, KVx30-309-6G and IT85D-3516-2 (introduced from RENACO research effort in 1987 and 1989) together with a local variety, Pliplolon. Web blight damaged cowpea severely due to protracted rainfall conditions in August and September. Damages were particularly great on cultivars Bambey-21, IT87S-1390, IS87-416N, TN88-63 and IT85D-3577.

- v) RENACO regional cowpea observation breeding nursery: The nursery was planted in early August. It was therefore, exposed to low rainfall and shiny weather conditions than the above-cited trials. No major disease infection on it was observed except cultivars KVx 291-47-222 and KVx 305-118-31 that exhibited viral disease susceptibility. Pod set was excellent for all cultivars including the local check in the insecticide protected replications.

With regards to insect pests unprotected replications which were separated from the protected plots by a barrier of a cereal crop, only the following cultivars had good to very good pod sets: IT89KD-374, IT86D-715, KVx 402-5-2, IT86D-879-1, IT87D-687-2 and Pliplolon.

- vi) Seed multiplication: Cultivars IT86D-3516-2, IT87S-1390, KVx 30-309-6G and IT86D-373 from RENACO and IS87-416N from Senegal were being multiplied for breeder's seed. They are intended to be used in 1992 for either further on-farm testing or for foundation seed increase to be passed onto private seed production farmers for commercial purposes.
- vii) On-farm cowpea production: Pure-stand cowpea crop was seen in several villages. I talked to some farmers in a certain village and they told me that they have been cropping two cowpea cultivars, IT82E-9 since 1989 and had started cropping IT83S-889 only this year. They said they liked them better than other cultivars because they are early maturing and high yielding and that they can be grown twice a year, i.e. in June to be harvested in September and September to be harvested in November, benefiting from the residual moisture. Of the two varieties, they prefer IT83S-889 to IT82E-9 because of its resistance/tolerance to insect pests, both on the field and storage.

The local cowpea variety Pliplolon is a photoperiod insensitive and appears to be resistant to major diseases, tolerant to insect pests and better adapted to the eastern and northern regions of the country. It bears thin and short cylindrical pods with small, smooth and mottled grains. It was

suggested that it be tested for resistance to the diseases found in the northern Guinea savanna as it can be a possible breeding material for disease resistance in that region.

## 7) Conclusion

A great deal of progress has been made in cowpea research in Guinea Bissau since 1987. The major cowpea production constraints, such as sowing dates and choice of cultivars are being tackled with great zeal. The technology development and transfer effort was found to be very effective, not only in the identification of better performing cultivars, but also the rapid transfer of same cultivars to farmers. The overall achievement in increased cowpea production during the last 5 years basically lies on the fact that a strong and active collaboration between agricultural research and extension workers including rural development services exist. Rural development services have made available a two-man team of specialists in cowpea protection and well equipped with sprayers and insecticides to help control cowpea crop against major insect pests in village community group farms.

**MALI: BAMAKO**

**(28 - 31 May, 1991)**

## 1) Introduction

Mali was made one of RENACO Associate Centers in 1990, with the responsibility of conducting technology validating research in cowpea breeding with special emphasis on *Striga* resistance. Different strains of *Striga gesnerioides* prevailing in Mali, including those that parasitizes on wild weeds, legumes and *Ipomeas sp.* have been collected. Known cowpea sources of resistance are being studied with the *Striga* strains.

The national cowpea program of Mali benefits from financial assistance of the International Development Research Center (IDRC) of Canada. However, that support ended in November 1990 as the IDRC Regional Coordinator for West Africa informed the RENACO Steering Committee at the Niamey , Niger, Workshop in March, 1991. The Coordinator also added that IDRC was still likely to continue its support to Mali for cowpea research, either through a bilateral agreement or through RENACO or both, provided a detailed and comprehensive research program was established and presented to IDRC for consideration.

Research workplans presented by the Mali National Cowpea Program at the Niamey Workshop was found to be inaccurate. Accordingly, the Network Coordinator were mandated by the Steering Committee to pay a visit to Mali in order to revise their workplans for the 1991 season with them on the spot.

## 2) Objective of visit

To review past cowpea research activities and the Mali's proposed research program to IDRC in 1991 and to draft a new three year proposal for cowpea research for submission to IDRC for possible funding.

### 3) The Visit

The visit was initially scheduled for 15-19 May 1991, but due to the late arrival of the USAID evaluation team for the end of SAFGRAD-II project, the visit was effected from 28-31 May, 1991. The Director General of the " Institut de l'Economie Rurale" (IER) was preoccupied with administrative and government matters as he had just been appointed to the post of Director General. I was therefore, unable to meet the new Director General or the Director of the Sotuba Research Station who was preparing for the visit of the Director General and other government dignitaries. Nevertheless, I met with the Cowpea Breeder, Mr. A. Traore and his assistant, Mr.S. Sow and we started work immediately. After reviewing previous research activities and findings and cowpea research programs submitted to IDRC, Mr Traore re-worked a new research workplan, taking into consideration the remarks made on the different topics during our discussions. The program was to be submitted to the IER authorities for onward transmission to IDRC.

The major features of the revised version of the Mali research workplans is as follows:

- Introduction of the use of successional sowing at key research stations as an effective method of screening entries for adaptation for the intended ecologies;
- Introduction of the single-seed-descendent selection method, by which crosses are made during the off-season in December in pot culture and plants advanced from F-1 to F-3 in wooden boxes beginning mid February to May and from May to July, respectively and screening F-4 plants for disease resistance in hot spot environment, Longorola in the northern Guinea savanna. To this effect, the F-4 plants will be planted at Longorola before August 12.
- Most of the crosses made so far were actually multiple reciprocal backcrosses done each year. They were recommended to be discontinued. They will be treated first as populations in 1991 from which lines shall be extracted for advancement for future progeny testing.
- The flow of germplasm from introduction to on-farm testing was clearly established.

- A planned visit for the Malian Cowpea Breeder and a *Striga* specialist to Burkina Faso and Niger in 1991 will offer them the opportunity to interact with cowpea scientists and acquaint themselves with research methodologies used in the said countries.
- Training sessions for extension workers are planned for 1992 and 1993. This is geared at up-grading the efficiency of extension workers in conducting on-farm testings in order to speed up the rapid release of new technologies to farmers.

The introduction of the successional sowing and the single-seed-descendent selection methods, both of which have proven effective in Burkina Faso will speed up the development of new varieties in about 7 years instead of the normal 12 year period. It is hoped that these efforts will step up the overall efficiency of the cowpea improvement programme in Mali and will enhance cowpea production and productivity in the near future.

A follow-up visit by the Cowpea Network Coordinator was planned before the end of the crop season.

**MALI: KOPORO & CINZANA**

(September 17 - 20, 1991)

## 1) Introduction

The Cowpea Network Coordinator effected a second visit to Mali following the one that took place in late May 1991. The objective of the first visit included:

- Review of cowpea research work plans for the 1991 crop season.
  
- Preparation of a 3-year budget proposal to be submitted to IDRC, Canada by Mali to seek support for cowpea research activities.

The second visit was to monitor cowpea research activities at two stations, namely Koporo in the Eastern and Cinzana in the Central regions of Mali.

Mali was entrusted the responsibility of conducting validation research with particular attention to *Striga gesnerioides* resistance. The Seno province and the Central region known to be a *Striga* problem areas are represented by the Koporo and Cinzana experimental stations, respectively. The Cowpea Network Coordinator was therefore obliged to monitor both RENACO regional trials and national program's work on *Striga* resistance at the two stations. This, in order to assess the level of *Striga* resistance to the various entries tested at the two sites.

We started the visit from Koporo in the Eastern region on 18/09/91 and ended at Cinzana in the Central region on 19/09/91. Unfortunately, the national cowpea coordinator, Mr. A. Traore could not join us for the visit due to financial difficulties. Nevertheless, the station chiefs and field technicians of both places were met and useful discussions were held together.

## 2) Field visits

### a) Koporo Expt. Station

#### Persons met

Mr. Gibril Tangara: Chief of station.

Mr. Yacouba Yarro: Field technician (cowpea).

The Koporo station is located in the Sahel with sandy soil and receives an average annual rainfall of about 600 mm from June to mid October. The following cowpea activities were carried out at Koporo.

- i) Screening of local varieties for *Striga* resistance: About 300 varieties were observed in a *Striga* sick plot. Cultivar KN-1 was used as a susceptible check. It was sown on every other five plots to sample *Striga* population in the soil. Two known *Striga* resistant check cultivars B301 and SUVITA-2 were also used. KN-1 was heavily infested with *Striga* in all plots. B301 was free from *Striga* whereas SUVITA-2 emerged a few *Striga* shoots, but some died before their flowering period. Eight varieties showed high level of *Striga* resistance, so did SUVITA-2. Variety TVu 1879 was outstanding and was free from *Striga* and had no any other disease symptoms.
- ii) RENACO regional *Striga* resistance trial: Twelve entries were tested. The susceptible check, IT82E-32 was heavily infested with *Striga* in all the replications. At the time of the visit, cultivars: KVx 397-6-6, KVx 402-19-5, B301, KVx 402-19-1 were found to be free from *Striga* infestation. The remaining entries showed high level of resistance to *Striga*.
- iii) RENACO regional adaptation trial for Sudanian and Sahelian zones: The trial was established in a *Striga* sick plot. At the time of the visit, cultivars were observed as follows with regards to *Striga* resistance:

- . KVx402-19-5 was free from *Striga* infestation.
  - . TVx3236, B89-504N, ITN89E-4, KVx396-4-5-2D, KB85-18 and the local check were heavily infested with *Striga*.
  - . The remaining entries exhibited moderate to high level of resistance to *Striga*.
- iv) Preliminary yield trial: Twelve composite varieties locally developed were tested.
- v) National early cowpea variety trial: Sixteen varieties were tested.

During a discussion with the Station chief of Kopro, Mr. G. Tangara informed me that cowpea variety SUVITA-2, introduced in Mali through RENACO-SAFGRAD had been released in the Seno province. He added that an FAO seed multiplication program based in the town of Koporokenié-Na was increasing its seed and distributing it to farmers in that area.

b) Cinzana station

**Persons met**

- An Acting head in the absence of Dr. O. Niangado, Director of the Cinzana station who was on official duty to Bamako.
- Mr. Tan-Oulé Coulibali, field technician (cowpea).

The Cinzana station is located in the Sudan savanna zone with an annual rainfall of 600-900 mm from June to October. Research activities conducted at this station were:

- i) Screening local varieties for *Striga* resistance: This same trial conducted at Kopro was repeated at Cinzana.
- ii) RENACO regional cowpea observation breeding nursery: Fourteen entries were observed in a *Striga* sick plot. The following entries appeared to be promising at podding time of our visit: KVx295-2-124-51, KVx402-5-2, KVx291-47-223, KVx295-2-124-99, IT86D-719, IT89KD-374, IT86D-879-1. They were free from *Striga* infestation and produced good number of pods.

iii) RENACO regional cowpea *Striga* resistance: Twelve entries were tested in a *Striga* sick plot. The trial was not sprayed with insecticide. The susceptible check, IT82E-32, was heavily infested with *Striga* in all the four replications. The following entries were free from *Striga* in all the replications: KVx291-47-222, B301 and KVx 164-65-5. With the exception of KVx402-5-2, all the remaining entries exhibited moderate to high level of resistance to *Striga*. The following entries were highly susceptible to:

- Viral diseases: KVx402-19-5, TN5-78, KVx397-6-6, KVx 164-65-5. KVx 402-19-1, KVx-305-118-31.
- Bacterial blight: KVx402-5-2, IT82D-849.
- Brown blotch: KVx397-6-6

It should be noted that IT82D-849 was infested with *Striga* only in one replication. This was observed in a single row of about 1.5 m long; plants were typically of IT82D-849 origin; there were no off-type plants around the plot.

iv) RENACO regional adaptation trial for Sudanian and Sahelian zones: Twelve entries were being tested. With the exception of KC85-7 and Amary-shô, a local check, most of the cultivars were of outstanding performance.

v) Preliminary yield trial: The same trial was conducted at Koporo.

vi) National early cowpea trial: The same trial was conducted at Koporo.

vii) Other activities

These included:

- **Screening of insecticides:** Basudin, Cymbush and Karate.
- **Seed multiplication:** Seed of cultivars SUVITA-2, KVx30-309-6G, KVx 61-1, Dan Illa and TVx 3236 were increased on about 1 hectare plot each. SUVITA-2, KVx30-309-6G, KVx 61-1 and TVx3236 were introduced in Mali through RENACO-SAFGRAD regional trial. Seeds of which are being supplied to farmers in that region: SUVITA-2, KVx30-309-6G and KVx 61-1 are *Striga* resistant cultivars. It is expected that seed yield losses due to *Striga gesnerioides* shall be reduced considerably if these varieties are accepted and adopted by the farmers.

### 3) Conclusion

Despite limited resources, the national cowpea program of Mali was able to conduct the most crucial trials aiming at identifying new and better performing technologies, necessary for sustainable agricultural production. Farmers are supplied with the badly needed seed. We hope that the donor agencies will provide Mali with the necessary support to keep up its cowpea research program which is already in an advanced state.

**NIGER**

(August 4 - 10, 1991)

### 1) Introduction

The Niger's cowpea program is one of the six RENACO Lead Centers entrusted with the responsibility of conducting technology development research in the areas of breeding for drought, *Striga*, and *Macrophomina* disease resistance, agronomic studies (millet-cowpea intercropping) and cowpea pathology (*Macrophomina spp*) for the Sahelian zone. Financial assistance of 275.000 CFA was advanced to Niger in two equal instalments during the 1990 cropping season. However, just like in 1988, Niger did not honour the RENACO laid down principle of returning justification before the second payment can be made. This again prompted the REANCO Steering Committee (SC) to take action thereby mandating the Chairman of the SC, Dr. O.O. Olufajo and the Cowpea Network Coordinator, Dr. N. Muleba, to visit Niger to discuss the issue with Niger's officials in-charge of research and offer advise as may be necessary.

### 2) Objectives of the visit

The primary objective of the visit was to meet with INRAN's authorities and administrators and again discuss with them ways and means of improving the participation and contribution of Niger in the cowpea network. Other objectives consisted of visiting INRAN cowpea research field plots, interact with national cowpea scientists and station administrators in order to get acquainted with cowpea research activities in Niger.

### 3) Participants

- . Dr. O.O. Olufajo, Chairman of the RENACO Steering Committee and driver, Mr. David Damwesh.
  
- . Dr. N. Muleba, RENACO Coordinator.  
Mr. Cisse Issa, driver.

4) PERSONS METTarna Station, near Maradi:

- . Mr. Adamou Ndiaye, Chef of Station
- . Mr. Hassane Hamma, Cowpea *Striga* specialist
- . Mr. Mohamed Mouhoun, Cowpea Breeder
- . Mr. H.A. Kadi-Kadi, Entomologist.

b) Konni Sub-station:

- . Mr. Illa Bawa, Chief of the Konni sub-station.

Oualam sub-station

- . Head of the Ouallam sub-station.

Kolo station

- . Chief of the Kolo station
- . Dr. Moussa Adamou, new Coordinator of INRAN's food crop research
- . Mr. Adamou Moutari, Cowpea Breeder and Cowpea Research Coordinator for Niger
- . Mr. Issoufou Kollo, phytopathologist

Gabougoura sub-station

- . Mr. Djibo Djibo, Chief of the Gabougoura sub-station

INRAN Headquarters, Niamey

- . Mr. Bawa, INRAN Director General
- . Dr. Ouatarra, INRAN Director of Research
- . Dr. B.B. Singh, IITA-GLIP Cowpea Breeder at the Kano, Nigeria sub-station.
- . Dr. D.A. Florini, IITA-GLIP Cowpea Pathologist at Ibadan, Nigeria.
- . Mr. Remy Adeleke, IITA-GLIP, in charge of international trials, Ibadan, Nigeria.
- . Drs. Singh and Florini, and Mr. Adeleke were also visiting INRAN in connection with ICRISAT-IITA-INRAN collaborative cowpea research activities in Niger, at Maradi, Magaria and Gabougoura as well as the ICRISAT-Sadore station.

### 5) Meeting with INRAN administrators

The visit took place on Wednesday August 7, at the INRAN's Headquarters Niamey. After a courtesy call on the Director General of INRAN, Mr. Bawa, together with Drs. B.B. Singh and Florini, and Mr. Adeleke, the RENACO mission met separately with the Director of research of INRAN, Dr. Ouatarra. Since Dr. Ouatarra has been newly appointed to the post of director of INRAN, he was not yet acquainted with the role of SAFGRAD. The RENACO mission therefore, briefed him on SAFGRAD in general, and RENACO in particular, i.e. organisation, objectives and activities; and the mission's objectives.

Three main items were discussed as follows:

- . Justification of the 275.000 F allocated to Niger in 1990 by RENACO;
- . INRAN cowpea annual progress report for the 1990 cropping season;
- . INRAN cowpea research work plans for the 1991 cropping season.

The justification for funds allocated to Niger by RENACO in 1990 was given to us at the meeting. The Director of Research (DR) apologized for the delay in returning the justification. He informed us of their financial difficulties (unpaid personnel salaries, representing about 90% of the total budget, etc) INRAN is experiencing. This prompted INRAN to restructure itself in order to improve its working efficiency. To this effect, the following are planned:

- . Decentralisation of INRAN administration and research activities;
- . Establishment of national crop commodity research programs;
- . Appointment of a Director of research (already done);
- . Appointment of head of stations;
- . Definition of the cooperation between INRAN and international, regional and national research institutions;
- . Establishment of overhead for research activities to be carried out by INRAN in collaboration or cooperation with other research institutions;

- . Establishment of a new management scheme in which new accounts will be opened for each specific national program and withdrawal of funds will require the signature of an INRAN administrator and the national coordinator of the national crop commodity research program.

The appointment of national crop commodity research program coordinator, and the heads of stations will be based on the election by peers for a specific period not exceeding three years. INRAN plans to seek the services of a consultant who will help streamline its activities. It is hoped that the re-structure and management will become functional by November 1991. With the re-organisation of INRAN, scientists will be motivated to work hard to improve their participation in RENACO activities. Mr. Moutari assured us that he will submit Niger's cowpea research work plans which were discussed in May 1991 at INRAN's annual research planning to the RENACO Coordinator. With regards to the 1990 cowpea agronomy and pathology annual progress reports, he indicated that they will be made available to RENACO as soon as they are ready. He attributed the delay to the fact that scientists in the agronomy and crop protection disciplines have the practice of reporting research projects after 3-4 years of execution. The report is usually presented in the publication style.

## 6) Field visit

The field visit started on August 5th from Tarna, near Maradi, and ended on August 9, at Gabougoura, near Niamey. The following research stations and sub-stations were visited in the Sudanian-Sahelian zones: Tarna, Konni, Kolo, Dounga and Gabougoura; and Oualam in the Sahel.

The following research activities were conducted:

- . Cowpea breeding: in all locations visited;
- . Cowpea *Striga* resistance studies at Tarna, Konni and Gabougoura;
- . Cowpea entomology at Tarna, Konni, Dounga and Oualam;
- . Cowpea pathology at Gabougoura.
- . Cowpea agronomy at Konni.

a) Cowpea breeding

Cowpea breeding activities consisted of:

Germplasm collection maintenance: 210 accessions were being regenerated at Gabougoura in one row plots.

Cowpea breeding observation nurseries: These consisted of F-2 to F-8 lines from various national crosses and IITA-ICRISAT-Sahelian Center cowpea research programs.

The crosses were as follows:

- . Sayi local x IT84E-1-108
- . Gabougoura local x IT84E-1-108
- . IT81D-994 x TN5-78
- . TN121-80 x TN5-78
- . B301 x TN5-78
- . TN93-80 x TN5-78
- . IT84E-1-108 x TN5-78
- . Dan-Illa x IT82D-716
- . Sadore local x IT82D-716
- . B111-2 x IT81D-994
- . ITN lines from IITA-ICRISAT-Sahelian Center Cowpea program
- . RENACO Regional observation nursery.

Preliminary yield trial of local varieties: Sixty landraces collected in Niger were compared with best cultivars under insect pest protection.

Advanced yield trial of F-8 lines/varieties: Eighteen lines were compared with 2 check cultivars: TN5-78 and TN88-63.

Yield trial of promising local landraces: Sixteen landraces were tested against four improved cultivars: TN5-78, KVx30-309-6G, KVx100-2 and IT85S-265-72.

Yield trial of promising cultivars: Fifteen introduced and locally developed cultivars were tested. They included: TN88-63, TD85-200, KVx30-309-6G, TN5-78, A18-1-1, KVx100-2, TN27-80, KB85-18, KVx396-4-5, ITN89E-4, KC85-7, TN3-78, L41-1, ITN89E-3, IT85S-265-72. Cultivar A18-1-1 was highly susceptible to a viral disease.

RENACO regional cowpea adaptation trial for the Sahel and Sudan savannas: 12 cultivars.

Yield trial of promising cowpea cultivars in millet-cowpea intercropping: 12 Cultivars.

Cowpea planting date trial: 12 cultivars and 3 sowing dates.

Effect of plant population density on cowpea performance: 4 cultivars and 4 sowing dates.

b) Striga resistance studies

National Striga resistance trial: Twelve cultivars were compared with two susceptible and two resistant checks.

RENACO 1990 regional Striga resistance trial: 12 cultivars

RENACO 1991-92 regional Striga resistance trial: 12 cultivars

RENACO 1991-92 regional cowpea observation breeding nursery: 14 cultivars

c) Cowpea entomology

Multiple insect pest (Aphids, thrips, Maruca, pod sucking bugs and bruchids) resistant trial: 12 mainly local varieties were tested without insect pest protection. Data will be collected for above-cited insects.

Aphids resistant trial: 39 lines and two checks cultivars were tested without protection against aphids. Aphids attack was high, especially at Maradi. It was favoured by two dry spells in the month of July.

RENACO 1991-92 regional cowpea observation breeding nursery:  
14 cultivars were tested without insecticide protection. The trial was heavily infested with aphids as a result of dry spells in the month of July. Insecticide was applied to suppress aphids and to prevent the highly susceptible cultivars from dying.

d) Cowpea pathology

Most of the breeding observation nurseries were established at Gabougoura to study the reaction of lines to natural infection of ashly stem blight, *Macrophomina spp.* Probably due to unusual and rather cool and rainy conditions, *Macrophomina* infection was very low as compared to previous years.

e) Cowpea agronomy

An agronomy trial was conducted at Konni. The effect of time of weed control in millet-cowpea intercropping was being studied.

7) COMMENTS

Inspite of financial difficulties that INRAN is experiencing now, national cowpea scientists are very enthusiastic and highly committed to their research work. They were able to implement the most crucial trials with very limited manpower. In general, the trials were well managed. There were, however, a few inevitable problems as follows:

- . Poor seed germination with RENACO regional cowpea *Striga* resistant trial at Tarna. This appeared to be a problem of location as the same trial with the same seed source at Konni and Gabougoura did not pose any germination problem.
- . Due to the financial handicap the plots were not weeded on time. However, since this was not at the very critical stage, no harm was caused. Hard work imposed on local manpower remedied the situation.

- . Soil heterogeneity exists at Gabougoura and Oualam sub-stations. At Gabougoura, cowpea growth and development in the 2nd and 4th replications of RENACO regional cowpea *Striga* resistant trials were hampered, probably due to high soil compaction. Whereas at Oualam, cowpea growth and development were poor in many spots of several fields. This can be attributed to micronutrient deficiency or toxicity while the spots appeared to be associated with ancient ceramic furnaces.
- . Viral diseases appeared to have caused severe damage at Maradi and Konni in some cowpea varieties particularly in the set of A lines (A18-1-1), descendent of crosses involving TN88-63.

Of a total of 15 cultivars being evaluated in advanced yield trial at several locations in Niger, 7 of them were either introduced from IITA-GLIP, IITA-GLIP-ICRISAT or RENACO. They included: IT85S-265-72, ITN89E-3, ITN89E-4, KVx30-309-6G, KVx100-2, KVx30-305-3G, and KVx396-4-5, respectively.

The Chief of the Konni sub-station informed us that he will be holding an open house before cowpea ripening this year. He intends to interact with extension workers, merchants and government authorities, as well as peasant farmers. In general, the national cowpea program of Niger appeared to be in good order.

Drs. O.O. Olufajo & N. Muleba.

## CONCLUSIONS

The visits made to national programs in 1991 was a very good representation of all the ecologies of cowpea growing areas in West and Central Africa. We were also able to see the performance of some varieties under the various ecological conditions and thereby permitted us to measure progress made in technology development by RENACO and IITA towards alleviating major cowpea production constraints.

The major observations of the inspection tour are summarized as follows:

- 1) **Sahelian and Sudanian zones:** Considerable progress is being made in the development of:
  - . drought and excess moisture tolerant cultivars;
  - . bacterial blight, bacterial pistule, viral diseases and *Striga* resistant cultivars;
  - . some insect pest tolerant cultivars, especially the descendance of crosses involving farmers varieties are being developed in certain ecological niches.
  - . some good cultivars, being products of concerted research efforts have either been released or are in the pipeline for release.
  
- 2) **Northern and Southern Guinea savannas:** Due to the drastic decrease of the regular crop season by 15-30 days during the last two decades, traditional varieties of the Guinea savannas are no longer adapted to these ecologies. Early maturing photosensitive cultivars introduced from the Sudan savanna and fitting the new cropping seasons of the Guinea savannas flower in early September and are therefore exposed to severe damages caused by disease outbreak during this period. The outbreak of diseases: viral, web blight, scab, brown blotch, septoria leaf spot, leaf smut, pod rot, etc, is favoured by the protracted rainfall in the months of July, August and September. In addition, cowpea sown in mid-July or August with the view of

escaping the diseases, suffer an adverse effect of soil moisture saturation, thereby affecting seedling establishment detrimentally.

The most vulnerable cowpea cultivars are those with large pods and rough seed coat and which are largely preferred by farmers. This vulnerability to diseases occurs only in early sowings: prior to mid-July or early-August depended on the regions.

There is the need therefore, to look for ways and means of improving cowpea for resistance to the above-cited diseases.

- 3) Striga and Alectra: These two parasitic weeds, together with the above-cited disease and insect pests problems open a challenge to national cowpea and IITA scientists to overcome them as soon as possible, say in about 5-10 years time. The most appropriate approach would therefore, be to incorporate most of the genes controlling these constraints into good agronomic backgrounds, high yielding with good stability accross locations.

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