**COORDINATION OFFICE** **INTER OFFICE**

**OAU/STRC - SAFGRAD**



# M E M O

December 19, 2000

**TO** : **Dr. Taye Bezuneh**
**International Coordinator**

**FROM** : **Dr. M. Ouedraogo**
**Research Associate**

**SUBJECT** : Sustainable Agricultural Program Implementation report

Please find enclosed herewith the implementation report of the Sustainable Agricultural Development Progam. This report concerns activities in Niger, Ghana, Togo, Benin, Burkina Faso and Nigeria.

ADB has asked for the semi-annual report to be submitted by Friday 22. Beside the above mentioned countries, we received also a progress report from Cap Verde which can be added for the drafting of the semi-annual report. Countries were contacted by fax and email to get their input. We lack complete information on activities in Mauritania, Senegal, and Cameroon. I am planning to contact them by telephone today.

The report Outline will be the same as the first semi-annual which copy is enclosed. I will submit to you the first draft tomorrow.

C:\My Documents\Niamey report ADB.doc

**Implementation Report of the Sustainable Agricultural Development Program**

## 1. Introduction

The goal of the Sustainable Agricultural Development Program is to enhance food security while mitigating environmental degradation due to human exploitation of land resources, and the physical change of the environment. The program has two main components:

i. The on-farm resource management which involves the integration of on-farm sub-components such as crops/livestock, trees, soils, etc. to improve agricultural productivity and complementarity in use and recycling of resources, and the diversification of income by farmers.

ii. The verification of food grain production technologies which is tailored to strengthen small National Agricultural Rechearch System (NARS) capabilities in the evaluation and screening of more productive food grain production technologies through agronomic trials.

The food grain production technology verification program involves 6 countries : Niger, Mauritania, Togo, Benin, Cameroon and Cap Verde, while the on-farm resource management component of the program is implemented in 4 countries: Burkina Faso, Ghana, Senegal, and Nigeria.

In the second year of Program implementation, field activities were monitored by the International Coordinator, the Regional Agronomist and the research assistant of OAU/STRC-SAFGRAD , from September 13, to October 10, 2000. The itinerary of the scientific monitoring team is in Annex 2. The objectives of this monitoring tour was: to assess the level of activities undertaken by the various scientists; and where necessary to advise on how to improve implementation in order to achieve program objectives and goals. Through field visit, discussion with farmers and participating scientits, and picturing, a certain number of key indicators were assessed and described.

During this monitoring, courtesy visits were paid to the Director General of INRAN, Niger, the DG of INRAB, Benin, the DG of ITRA, Togo and the director of SARI, Ghana. This report summarizes the findings of the monitoring tour in terms of progress made in the implementation of trials activities in countries visited, as well as the recommendations made to address shortcomings.

## 1. On-farm verification of improved cowpea varieties, INRAN, Niger

### Introduction

Niger is a very important cowpea producing country. In terms of production, it ranks second after Nigeria on the African Continent. Current cowpea production is faced with irregular and shorter annual rainfalls and different pest attack which causes important yield losses. Sustained increase in production of cowpea requires the use of improved agronomic practices and improved high yielding insect and disease tolerant varieties.

The on-farm verification of improved cowpea varieties was developed with the following objectives:

To identify, with farmer participation, pest resistant high grain yielding cowpea varieties;

To help farmers disseminate the selected cowpea varieties through seed production and sale.

### Activities Undertaken

#### Variety demonstration trials

In Niger, activities of the cowpea program were undertaken for the second year in two regions:

- At Konni, some 430 km east of Niamey, the major ethnic group is Haoussa. Irrigation is well practiced in this region and during the dry season vegetables crops such as onion and tomato are important sources of revenue. The use of chemical fertilizers in the onion field turned out to provide some beneficial effect to the follow up crops grown during the rainy season.

- At Koure, some 50 km east of Niamey, soils are generally poor and a lack of water is apparent. Very little fertilizer is applied. Giraffes are present in this zone. While they are very friendly with people, they can cause significant damage to cowpea whose vine and particularly seed they like to eat.

In the two regions, the technology being demonstrated consisted of improved cowpea varieties, and improved agronomic practices (fertilization and application of insecticide). The following design was used:

On-farm verification trials in sole cowpea: Two varieties of improved cowpea cultivars (IT 90K, TN 121 80) and the local variety were compared in 20 x 12 m plots without replication. Spacing between rows and within row varied from farm to farm (in general 80 cm to 150 cm).

In on-farm verification trials of cowpea grown in association with millet, the same varieties were compared in association with an improved millet cultivar. Between row spacing tended to be wider in the association trial (1.5 m or more).

In each of the two regions, trials were implemented in 13 villages. In the Koure region, 6 trials, three of each type were conducted in each village, while two to five trials were implemented in the Konni region..
Each trial is managed by an individual farmer or group /association of farmers.

**On-farm seed production**

The following seed multiplication farms were implemented:

Konni (2 ha)

| | |
|---|---|
| IT90K | 1 ha |
| TN 121-80 | 1 ha |

Koure (7.5 ha) (4 ha for men's groups, 2 ha for women's groups, 1.5 ha for private producer)

| | |
|---|---|
| TN121-80 | 1 ha |
| IT90K | 0.5 ha |
| TN 578 | 2 ha |
| TN2780 | 1.5 ha |
| TN 2887 | 2 ha |
| KVx 30-309G | 0.5 ha |

**On-station seed production**

The Konni Station which has irrigation facilities that work during the dry season, was selected for seed production:

Konni (3 ha)

| | |
|---|---|
| TN121-80 | 0.75 ha |
| IT90K | 0.5 ha |
| TN 578 | 0.5 ha |
| TN2780 | 0.5 ha |
| TN 2887 | 0.25 ha |
| KVx 30-309G | 0.5 ha |

Seed were also produced at Tara and Maradi

Tara (0.5 ha)

| | |
|---|---|
| TN121-80 | 0.25 ha |
| IT90K | 0.25 ha |

Maradi (1.25 ha)

| | |
|---|---|
| TN121-80 | 0.25 ha |
| IT90K | 0.25 ha |
| TN 578 | 0.25 ha |
| TN2780 | 0.25 ha |
| TN 2887 | 0.25 ha |

**General Observations**

**i Status of trials:**

- **on-farm trial**

A total of 12 farms were visited in both regions. Rainfall in Niger particularly on sites where demonstration trials were implemented, were less than average. Cumulative rainfall up to the date of the visit was about 350 mm, far short of the average 450 to 500 mm. The months of August and September were particularly low in rainfall. In some places like Koure, drought spells of more than 20 days were recorded.

Planting was done a little late in some trials (mid to end of July) because of drought spells which also caused a delay in plant development in August. During the visit, the canopy of the cowpea was not covering the ground as expected.

A lack of rain also caused a delay in insecticide application to a few days after the appearance of flower buds. This is not the recommended application. In some places around Koure, pods were already formed and yet insecticide had not been applied even once.

Insect attacks such as aphids were noted in the local variety at Gardjigue while bacterial blight was noticed on TN12180.

At Konni, however, drought spell were not readily detectable at the time of visit. Plant development was better and also reflect the better growing conditions compared to the Koure region.

- **Seed multiplication**

Each seed producing farm covered the two best varieties selected by the beneficiaries.

Seed multiplication was done particularly with farmer groups. The women association of Sine Kouara (Barimouzoumou) was created in 1997. It has 101 members who are all women. This association produces 1 ha of TN 578 and TN2887. One of the characteristics of this association is the production of sesame, okra, groundnut, and recently, cowpea. The cowpea seed produced will be sold primarily to the members and the remainder to the other farmers. They plan to use cowpea residue to feed small ruminants.

Seed production was also undertaken at Konni, but we could not visit these plots due to a lack of time.

Seed multiplication, in general, does not meet all the criteria for certified seed. The phytosanitary monitoring of seed production had not different from regular grain production. In fact, at Koure, seed production has not received any insecticide application as of the day of our visit. However, it was clear that roguing and seed purification will be done through training the farmers involved in seed production, in collaboration with the extension agent (Mr. Mahamadou Adamou, Chief of the agricultural district of Koure) who has received intensive training in seed multiplication.

**Remark:**
Seed production is no more expensive than grain production. Furthermore, one can expect that farmers will be tempted to use the seed for their own consumption.

On-station seed production was very well maintained with regular sprays. The vine covered the soil very well and the plots had already been treated twice by the time of our visit. It is expected that good quality seed will be produced in these multiplications.

### ii Appropriateness of the activities in addressing farmers' needs

As mentioned above, the trials are concentrated around Koure (around Kollo) and Konni. The theme under consideration (improved variety) is of importance to many regions in Niger. The number of trials implemented is adequate as far as the proposed protocol is concerned. One could argue the necessity of more spatial repartition of the trials in the future to improve the efficiency of country coverage. However, in light of the distances involved, most of the resources could be lost in travel expenses in that case.

The fitness of the technology in terms of addressing the needs of the farmer is somewhat a function of the involvement of the latter in the planning of the activity. In general, farmers interviewed believed that the new cowpea varieties are more early maturing and higher yielding than their local varieties. For example, the women's group at Gardjigue seem to prefer the variety IT90 K over the local variety. In addition, seed multiplication is done based on their identified needs determined from results of previous demonstration trials. Farmers involved in seed multiplication select their preferred

cowpea varieties. This selection usually takes into account the preferences of the other producers in the village or possible beneficiaries.

### iii Farmer access to trials

On average, 20 farmers have access to most of the trials, whether from the same village or from elsewhere. In one village near Konni where the demonstration trial was managed by researchers and farmers, the trial was very well maintained and retained the attention of most farmers who pass by it to reach a water reservoir. The farmers seem to be very enthusiastic about the trial and seem to prefer the variety IT90K.

Most farmers in the same village have access to the trials more than two times during the growing season, therefore increasing the chances of understanding the technology tested. However, organized visits were not frequent or did not take place at all. Group visits allow farmers to interact as the trials are a school of learning. In the future, more such activities should be organized.

### iv Partnerships in activity implementation

In the implementation of these activities, several partners are involved: The Ministry of Agriculture through extension agents (field men), Research, and in some cases, other projects working on similar objectives. This was the case for the project PRIVAT (Projet Participatif de Renforcement des Institutions Villageoises pour le Developpment de l'Agriculture dans le Departement de Tahoua) in Konni and Tahoua. The extension agent is the field man who usually assists in the direct implementation of the program. He receives the information from the scientist in charge and does the selection of the villages, the farmers, or group of farmers. He participates in the animation of the program by sensitizing participating farmers, training them in seed production, application of fertilizer and insecticide, field trial delimitation, etc. He also keeps most records on field activities and plans the field days in collaboration with research.

**Recommendations**

The number of trials involved seemed to be overwhelming for the effort of only one individual. This explains the differences among trials around Koure. The frequency of visits to the farmers is about once every two weeks. Thus, farmers tended to do some activities unassisted particularly planting, which is highly dependant on rainfall. Furthermore, we have observed significant differences in spacing among trials.

## 2. On-farm verification of improved maize varieties, INRAN, Niger

**Introduction**

As a Sahelian country, Niger, at first sight, does not seem to have potential for maize production, because of the high requirements of this crop in terms of water and fertilizers. The use of maize as a green vegetable is highly common in Niger and attracts lots of business from neighboring countries like Nigeria and Benin. Furthermore, the development of early and extra early maize varieties and the existence of irrigation facilities are important factors favoring the use of maize in the contribution towards resolving of food security problems. Indeed, these new varieties of maize are ready and available early in the cropping season when late maturing local varieties are not yet harvested and can, therefore, fill the hunger gap.

The objectives of this project are to:

Conduct on-farm testing of maize varieties

Train farmers in the production of certified seed

Insure provision of foundation seed of selected varieties

**Activities Undertaken**

The maize program, headed by Mr. Jika Naino, had activities at Kollo and around Niamey and Konni.

Three varieties were tested at Kollo and Konni: P3 Kollo, EV84 SR, and EV89TZEE. Plot size were 10 x 10 or 10 x20 depending on space availability.

Around Niamey, farmers were also given seed to produce maize using the improved technologies. These advanced farmers were closely followed by other farmers (usually their neighbors) and are used as disseminators of the technology.

At Kollo, seed multiplication was done by five farmers for a total 2.75 ha of P3 Kollo (1.75 ha), Maka (0.75 ha), and EV 84-SR (0.25 ha).

At Gaya, around Bengou, eight farmers in the villages of Tondika and Tounga were involved in seed multiplication and on-farm trials.

A socio-economic survey was also initiated under the leadership of Boureima Moussa from the Department of Rural Economy of INRAN.

**General Observations**

**i Status of trial**

Three tests were visited around Kollo. Drought spells had affected maize considerably. In most cases, very few cobs were formed.

At Konni, Mr. Illa Baoua, a retired extension agent, helped to set up the trials as well as identify farmers participating in the trials. Six farms were visited. Maize fields were better and were producing better crop than those in the Niamey region. Five farmers were involved in the maize demonstration trials. In general, the plants were good and the trials seemed to have a good outlook.

One of the problems encountered, however, is the renewal of maize seed. Farmers usually use their own seed for over four years. They have to resort to INRAN for certified seed, which they think is too expensive or sometimes not available. In collaboration with ONAHA, training of seed producers will be done by the end of September 2000.

**Seed Multiplication**

Seed production as practiced in Niger for both maize and cowpea may not really follow procedures necessary to guaranty the quality of the product. Some of the key factors are:

Utilization of farmer seed for seed multiplication

Seed producers not always qualified

Criteria for isolation in space or time not always followed allowing crosses particularly for maize

As a result, seed produced is not really certified seed. However, farmers sell it as certified seed and also use some for they own food. A scheme of certified seed production is needed since there are farmers who already had some training in seed production and the extension agents also seem qualified to undertake the task of training the potential seed producers.

**ii. Appropriateness of the activities in meeting farmers' needs**

The number of trials implemented is in accordance with the protocol. However, its spread, particularly around Niamey under rainfall conditions is questionable. Traditionnally, the amount of rainfall around Niamey and its repartition make maize an unlikely crop for the zone, although extra early maturing varieties are used. As a nontraditional crop, the scientist has to literally push the new maize varieties in order to facilitate their adoption.

However, farmers are convinced of the appropriateness of the technology, particularly as green maize around Kollo (near the river bank) and at Konni. They believe in the importance of these new varieties in bridging the hunger gap when traditional staples of sorghum and millet are not yet ready. As green maize, these varieties also provide cash at a time when it is much needed.

In Kollo, Hama Sadou had a seed multiplication trial of P3 Kollo and Maka on 1.5 ha of land. His production is sold as green maize and the remainder used as seed. Three cobs are sold for 100 CFA. A total of 80 000 CFA could be gained per ha, and 400 kg of seed

produced. His plots were implemented using extension services and seed provided by INRAN. In general, one third of the total production is sold and the rest is used as seed.

Farmers at Kollo tend to prefer P3 Kollo while at Konni, the early maize variety Maka is preferred. In this region, farmers produce cotton, and wheat, under irrigation during the off season. They would like also to produce maize during the off season.

### iii. Farmer access to trials

At Kollo and around Niamey, maize trials were well exposed with easy access to farmers. In some places, trials are around or within family compounds, allowing participating farmers to easily exchange their experiences during break time. On average, 5 to 10 people have access to these trials on a continuous basis. However, at Konni, most of the demonstration trials were hidden within sorghum fields to avoid burglary. No need to mention that very few people will have access to these demonstration fields. For the same reason, field day were not organized because it would be an invitation to burglarize the field. Use of guards should be considered if an impact is to be realized with the maize tests in Niger.

### iv Partnership in trial implementation

Limited partnerships exist between research and extension in the implementation of the maize activity. Participating farmers are sometimes handpicked based on their capability to influence other producers and the availability of manpower to implement the activities. Informal partnerships exist with ONAHA in the training of seed producers.

### Recommendations

Guards should be used for demonstration fields of maize to avoid burglary and yet achieve the goal of visitation by other farmers.

Seed multiplication should be reviewed and improved in terms of foundation seed used and also following of guidelines

Production of maize around Niamey should be reviewed and perhaps limited resources focused around the basin of the Niger River where irrigation is readily available in cases of severe water stress and at Konni.

**Agricultural intensification in northern Ghana: the influence of crop-livestock integration and composting on maize-groundnut cropping system**

**Introduction**

Northern Ghana, with annual rainfall ranging from 900-1100mm is favorable for agricultural and animal production. Poor soil fertility, combined with poor management of livestock sparked the development of research activities in the integration of the two activities. Today, substantial amounts of data in soil management practices as well as livestock rearing techniques are made available by SARI.

The objectives of the program in Ghana were to improve food security through crop-livestock integration and soil nutrient recycling. Specifically, the program aimed to:
Improve maize yield and minimize its production cost
Improve soil productivity
Promote proper agronomic practices through crop rotation and intercropping
Promote composting
Promote small ruminant production
Promote animal traction as land preparation method
Examine the socio-economic feasibility of the proposed intervention in the zone.

In Ghana, the Sustainable Agricultural Development activities were done in two agroecological zones: Northern and Upper East Regions. In the following, we shall examine these projects separately

**1. Northern Region Program**

The main activities of farmers in this region include cultivating maize, yam, rice, groundnut and cassava, and rearing livestock. Lands are usually cultivated for about 10 consecutive years and then left fallow for a maximum of three years. Crop rotation, is practiced, usually a maize-groundnut rotation. Small ruminant holdings are usually in the range of 5 – 25.

In this region, two villages were selected for trial implementation. These villages were sites of a previous small ruminant project funded by IFAD through MOFA.

**Activities Undertaken**

The Savelugu-Nanton district is about 25 km north of Tamale. The Tindang and Kwadushegu farming communities, which are about 12-15 km away from Savelugu are the sites where activities are undertaken.

The technology tested consisted of an alternative fertilization rate, use of compost, and /or crop rotation. Seven farmers and eight farmers, respectively, were involved in the Tindang and Kwadushegu farming comunities. Plot size was 20 x 40 m. In this location, the tests consisted of 5 treatments as follows:

Sole maize with compost for continuous cropping
Sole maize with compost rotated with groundnut
Sole groundnut rotated with maize
Sole maize with full rate fertilizer (60 kg N/ha)
Sole maize with half rate fertilizer (30 kg N/ha)

Data collected include the soil and manure samples for analysis. Plant samples will also be collected.

**Other Activities Planned**

Training will be undertaken for making compost in the next two weeks.

Animal fattening activities will start in December 2000 with the feeding trials and also training in animal shed building, etc. The small ruminants will be fed using cassava leaves and peels, cajanus cajun, groundnut vine, maize stover, and rice straw.

A field day was planned, but was not yet organized at the time of our visit.
The socio economic aspect will be undertaken by Mr. Osman Gyasi.

**General Observations**

**i. Status of Trials**

Trials were implemented according to the proposal. The funds were received on time to allow implementation of the activities. It should be noted that, Dr. Victor Clottey is now in charge of the program in light of the departure of M. Agyare to graduate school.

At the time of our visit, trials in the Northern Region were well maintained. Planting was done between July 12 and August 5 because of a rain delay. The rain also caused delay in plant growth. On average, two weedings were done in most fields visited. All the maize plots had a very good outlook, and it is expected that good yield will be obtained. The plot with 1/2 rate fertilizer was not as good as the rest, according to the farmers. They seem to prefer the plots which received manure application. The fertilizer treated plots had darker leaves compared to the manure treated plots.

**ii. Appropriateness of the activities in meeting farmers' needs**

The number of trials implemented is in agreement with the protocol. It spread across two villages where soil fertility management is crucial despite the animal production activities.

Interviewed farmers revealed that to resolve the problems of soil fertility, they resort to practicing rotation and application of manure, particularly on maize. However, the quantities are usually small because large quantities are not available due to the free ranging manner in which livestock are kept. Chemical fertilizer is rarely applied, because of its high cost. When chemical fertilizer is available it is usually applied to maize. Furthermore, the activities on soil fertility management are in line with addressing farmers' needs. As noted above, farmers seem to prefer the plots which received manure application, although the fertilizer treated plot had darker leaves compared to the manure treated plots.

Problems faced by farmers with small ruminants rearing include dry season feeding, housing, animal health problems during the rainy season, and high livestock mortality rate. As noted by the farmers there are several benefits to raising small ruminants, as done by SARI. One is the rapid growth of animals gives increased revenue to the owners. By parking animals, theft is reduced and so are the conflicts in the community over ownership of the animals. In addition, revenues from animal sales are used toward household expenses etc.

### iii. Farmer access to trials

Eight and nine trials, respectively, were implemented in the first and second village. The spread of these trials across the two farming communities seemed adequate to allow farmers to access the trials. Fields were also well located to allow other farmers to visit. However, the field visit, although planned was not executed.

### iv. Partnerships

The activities were conducted in partnership with MOFA. The extension system is quite involved to insure that appropriate technologies are transferred to farmers with their participation. The visit was done in collaboration with the livestock subject matter specialist, an extension agent of MOFA.

### Constraint in trial implementation

Some of the constraint to implementation include:

- Lack of bullock for animal traction, access to water is very difficult particularly for human and animal needs.
- No animal scientist in the upper east region
- Rainfall was late delaying project activity implementation
- Moving funds from one institute to another is sometimes difficult and time consuming.
- Transport of manure to the farms is also problematic.

## 2. Upper East Region

The second location is in the upper east region in Manga near Bawku. There are the Binduri and Sakore farming communities, about 15 – 20 km away from Bawku. The inhabitants are multi-ethnic – i.e. Kusasi, Mossi, Busanga, and Mamprusi. The main occupations includes cropping and livestock rearing. The crops usually cultivated in the site include millet, maize, sorghum, groundnut, soybean, cowpea, tomatoes, onion and cotton. Cereals and legumes are usually cultivated as intercrops and to a limited extent in rotation. Farmers do apply manure when available and chemical fertilizer when they can afford it but at sub-recommended rates. Manure is usually not available in the large quantities desired because of the free ranging livestock system. Small ruminant population per farm household is in the range of 5 – 20. The main constraints to small ruminant production are health problems, dry season feeding, and watering during the dry season and thefts. Small ruminants are usually kept in pens during the rainy season and allowed on free range during the dry season.

### Activities Undertaken

The same technologies tested in the northern Region were tested here with the exception that intercropping was used instead of rotation.

In this region, trials were conducted in the village of Bindure. The trial design consisted of:

Sole maize with manure 6 t/ha + 30 kg N/ha

Sole maize with full rate fertilizer (60 kg N/ha)

Sole maize with half rate fertilizer (30 kg N/ha)

Maize/Groundnut intercropping in alternate rows, with 15 kg N/ha on maize only.

The plot size was 20 x 20 m. It was not replicated. Thirteen farmers were originally part of the activity at Bindure, but it was downsized to nine.

Planting was done early in mid to late June.

Soil samples and manure samples were collected for analysis. Plant tissue samples were not collected for analysis.

**General observations**

In the upper east region, sorghum tended to be the most predominant crop. Maize is usually cropped around the family compound where soils are more fertile. At the time of our visit, most maize crops were at maturity. In fact, soils are not that fertile and striga infestation was evident in most farms. Some groundnut had already been harvested and the maize was soon to be harvested.

The level of rainfall was low and negatively affected the maize crop. Annual rainfall to date was 900 mm.

While it was difficult seeing differences in the field, the majority of farmers seemed to prefer the plot where maize received some manure and 1/2 the rate of recommended fertilizer.

It should be noted that in this region intercropping of maize and soybean is well developed., The spatial arrangement 1/2 maize/soybean on the same row seems to be favorable for the growth of both crops.

Composting training is planned for second week of October 2000. Animals are traditionally housed in not well aerated sheds, and animal health care is a problem causing death in small ruminants. Training on improved housing for the small ruminants will also be undertaken. The team at Bindure may have to use MOFA extension specialists for this training at Bindure.

**Constraints in activity implementation**

Animal feed is a real problem and farmers do not think they can park their animals all year long. Water is available in the reservoirs, but there is a serious logistical problem of logistics for transporting water home for human and also animals.

Production of compost is a major constraint as it requires some equipment for digging, etc.

The program in Upper East lost the collaborating soil scientist at the beginning of the rainy season. (end of July). The soil technician is actually filling the gap before a new scientist is hired.

**Recommendations and suggestions**

- Striga is a major problem in the Upper East region. Therefore, it is suggested that selected maize varieties for future activities be varieties with some resistance to striga.
- Soybean is also a very important crop being used for food and sold as a cash crop in the region. Since there are varieties of soybean known for their striga trap cropping ability, it may be good to use soybean in place of groundnut in the Upper East Region trials.
- The use of sorghum should not be overlooked in this region.
- The combination of fertilizer and manure may be a good technology as far as yield is concerned, but in terms of affordability, it may be a very challenging experience for resource poor farmers. We suggest that, in light of the results of the first year, a concertation be done with all team members in order to change if necessary the design of the trials in the Upper East region.

**Promotion of early maturing sorghum varieties in the farming system of the savanna region of northern Togo.**

**Introduction**

In northern Togo, sorghum is used for food (to ) and for local beer, which is highly appreciated. The cultivation of the crop is widespread in the region (55% of cropped land). In recent years, the local varieties have shown poor adaptation to the climatic conditions characterized by irregular rainfalls and shortened periods of precipitation. Assuring food security in this region will depend on sorghum production.

ITRA has developed early maturing sorghum varieties, Sovarto1 and Sovarto 28 which in on-station research have shown to be well adapted to the present climatic conditions of the region.

The objective of this on-farm technology verification project was to:

- Promote new varieties of sorghum in order to increase the production of this cereal to the local producer level.

**Activities Undertaken**

Activities in Togo were undertaken in the Tone and Tandjoare departments around Dapaong, northern Togo. In each department, 4 villages are chosen. The technology tested consisted of two improved early maturing sorghum varieties combined with fertilization.

**Trial design**

The demonstration plots consisted of three treatments: Sovarto 1, Sovarto 28, and the farmer variety. Plot size was 30 X 20 m. Each plot was fertilized with 200 kg/ha NPK. In addition, manure was incorporated at the beginning before ploughing.

Five farmers were chosen per village for a total of 50 farmers. The activities were spread over four extension agents: Timbou and Dore: 10 farmers each

Naki-Ouest and Sissiak 15 farmers each

In about half of the tests, sorghum was produced in association with cowpea, 4/1 (4 rows of sorghum for one row of cowpea) and half as sole sorghum crop.

**Training of Extension agents**

Before the implementation of the trials, the extension agents received a two day training. This training concerned the four extension agents in charge of following the on-farm trials. Theme convered during the training were: Generalities on sorghum, its production and improvement, the tools used in the demonstation field, etc.. The two day training was

done in collaboration with ICAT and taught by three trainers. Documents on the protocol, of on-farm demonstration trials, (how to collect agronomic and socioeconomic data) were distributed to the extension agents.

Planning was also underway to determine baseline information which could lead to determining the socio-economic impact of the new varieties.

**General Observations**

**i. Trial status**

In the Tone Department, eight farmers were visited. At the time of our visit all had already harvested the sorghum. Cowpea was still in need of harvesting. Sovarto 1 is a white endosperm sorghum which has S34 in its parentage. It is also highly appreciated by birds which can cause lot of damage when it's planted early. Expected yield on farmers' field will exceed 3 to 4 t/ha. Sovarto 28 has a red seed coat and is mostly used for local beer which is very appreciated in the region. Some of the farmers reported difference in ease in threshing, but this might be more due to the effect of humidity when not properly dried.

Observations in the Tandjouare Department are similar to those above. However, the farmers we visited there reported less bird attacks on Sovarto 1 perhaps because of the late planting. In this department, there is more rainfall compared to Tone.

The producers were very interested by the trials and they showed very good mobilization for the implementation and follow-up. Through discussion with farmers, we learned:

- The two varieties of sorghum tested are earlier maturing than the local variety.
- Sorvato 28 is a little earlier maturing that Sorvato 1.
- Farmers noted that the new varieties were more windfall resistant than the local varieties.

With theses trials, it can be concluded that the objectives will be reached. Even before harvest of the crops, the producers, including other non-participant had already made their choices. They seem to like intercropping even though they were opposed to it at the beginning of the season, because it helped manage soil fertility while sustaining problems of land availability. The choice of varieties varied according to the farmers. Some preferred both varieties while others preferred one or the other: Sorvato 28 is chosen for its earliness whereas Sorvato 1 got the attention of the producers for the size of its panicles synonymous with high production. In all cases, the new varieties are preferred compared to the check.

**ii. Appropriateness of the activities in meeting farmers' needs**

About half of the number of trials proposed have been implemented in Togo. Originally, it was supposed to cover 100 farms, but due to late implementation and the lack of available land, only 50 farms were put in place.

The technology tested is in line with farmers' main needs.

Interviewed farmers reported that in these regions, the reduction in the amount of rainfall has made the varieties not fitted for the region. Furthermore, there was need for new early maturing sorghum varieties. In addition, sorghum is an important cereal in Togo and is used for making to a traditional dish "to" and local beer. In general, farmers were enthousiatic about the two varieties. They were appreciated for high yield and early maturity; and also the taste of the beer for Sovarto 28; and the quality and taste of the to for sovarto 1. In the local market, grain of sovarto 1 cost more than the local variety (150 F instead of 125 F per unit). Farmers are eager to crop more area in Sovarto 1 or 28. Promotion of these varieties is part of a strategy implemented in other regions of the country has indicated the regional director of Agriculture, livestock and fisheries. As for farmers' participation in the implementation of the trial, it can be noted that they were very active and understand the objectives of the trials.

### iii. Farmer access to trials

Very good work was done on implementing the activities in Togo. Besides having land available, participating farmers must be willing and open to the innovations, and have at least 0,75 ha of land suitable to sorghum. In addition, the land where the test will be implanted must be accessible at all time during the rainy season.

The choice of the villages and farms was done to allow very easy access to the demonstration fields. Most fields visited were along a roadside. Farmers reported that on average, between 20 and 30 farmers visited their plots at least twice during the cropping season. At a certain stage, most farmers made requests for seed of Sovarto 1 and Sovarto 28.

While it was proposed to have visitations of the farmers across the departments, this activity could not be carried out. Instead, the trials were videotape and farmers interacted with scientists and gave their opinions on the trials. A meeting with farmers at the end of October is planned when yield data will be available for all trials.

### iv. Partnerships in trial implementation

Activities were implemented in coordination with ICAT (Institut de Conseil et d'Appuie Technique), the institute in charge of extension. ICAT has agents located throughout the departments. They participate in the selection of farmers as well as the implementation of the activities.

Very good collaboration exists between ICAT and ITRA in the implementation of these trials. However, this collaboration with the extension agency (ICAT) may not be taken for granted and should be improved upon. They may need to provide the extension agents with funds for gasoline in order to facilitate follow-up on the activities.

### Constraints to trial implementation

The earliness of new varieties made them mature at a time when they were susceptible to grain mold. A larger space for drying the grain is to avoid molding.

**Recommendations**

The demonstration trials in Togo were well implemented to reach the objectives set. The farmers were well involved in the activities and understand very well the objectives of the study.

The use of 200 kg NPK per ha, however, does not reflect the capacity of the farmer to provide fertilizer as most do not fertilize sorghum in general. It may be necessary to determine the response of the improved varieties to lower levels of fertilizer.

Yield estimations were done using the whole plot. In view of the large size of these plots, it may be more adequate to use yield plots instead. This, in return, will make grain available to the farmers immediately at harvest.

Seed demand for the new varieties is high and will definitely grow higher in the second year. In order to satisfy demand, the seed multiplication system must be improved. A scheme similar to community seed production used by WECAMAN for maize in Togo could serve as an example for seed provision. The program could help in the organization of seed producers and facilitate their production and commercialization.

**On-farm demonstration of improved cereal and legume varieties in northern Benin**

**Introduction**

In northern Benin, constraints to production are poor soil fertility, lack of improved seed, inadequate rainfall, and pest attacks. The problem of food grain has been exacerbated by the high preference of farmers for cotton production. Under the sustainable agricultural development program, INRAB decided to conduct on-farm assessments of maize, cowpea, and groundnut varieties. The objectives are to:

Improve the sustainability of the farming systems

Improve food security and increase farmer income

Provide raw material to local agro-processing units

**Activities Undertaken**

On-farm verification tests:

The locality where the trials were implemented are: Ina, Angaradebou, Thui, Bagou and Sokka, in northern Benin. Rainfall in this region is about 900 to 1000 mm per year. Crops include maize, sorghum, millet, yam, cassava, groundnut, and cowpea.

Due to seed limitations, trials were undertaken for maize and cowpea only in the first year.

Each maize trial was composed of three treatments: TZEE-SR and QPM (Faaba) and a local check which is the farmer variety. Each plot had an area of 200 m2. Each farmer constituted a replication. A total of 19 trials were implemented with the 19 farmers involved.

Cowpea verification trials included IT95K-193-12, IT95K-362-7, and a local variety in Sokka. At Angaradebou, IT97K-499-39, IT89KD-349, and IT95K-627-34 and a local variety were tested. A total of 10 farmers conducted the on-farm cowpea varietal trials. In most cases, the same farmer implemented both maize and cowpea trials.

Seed multiplication:

The following varieties were increased to meet the seed need for the 2001 on-farm trials:

| Crop | | Variety | Area |
|---|---|---|---|
| Maize- | | TZEE-SR | 1250 m2 |
| | - | FAABA (QPM) | 1250 m2 |
| Groundnut | | ICGV-SM-86028 | 400 m2 |
| | - | EH 303-4 | " |
| | - | ICGV-SM 85045 | " |

| | | | | |
|---|---|---|---|---|
| | - | EH 33-35 | | " |
| | - | CN 115 BS | | " |
| Cowpea | - | IT 97K-499-39 | : | 707,6 m2 |
| | - | IT 95K-627-34 | | 768,8 m2 |
| | - | IT 95K-193-12 | : | 964 m2 |
| | - | IT 95K-362-7 | : | 61,6 m2 |
| | - | IT 89KD-349 | : | 399,6 m2 |

**General Observations**

**i. Trial status**

The rainy season was well advanced by the time of our visit. In some localities like Angaradebou, drought spells during the first two weeks of September caused severed damage to plant growth, therefore, reducing the expected yield.

The tests were very well maintained. Some of the maize crops were close to maturity and harvest was soon approaching. Farmers understood the objectives of the trials. Some farmers tended to already prefer TZEE because of its earliness. They did, however, acknowledge the fact that Faaba had higher yielding potential. The local variety seemed to be more affected by drought spells while symptoms of *Turcicum maidis* was apparent on all varieties. In other situations, the local variety seemed to be more healthy compared to the improved varieties.

At Bagou, in some tests, late planting and excess rainfall had impeded the development of TZEE.

For cowpea, farmers preferred IT 97K for its earliness and IT 89KD-349 for its high yield. At Sokha where many cowpea trials were implemented, farmers tended to prefer for IT95K627-34 because of its high production. During our visit, most of the insecticide treatments were realized and pods were well formed.

Seed multiplication at Bagou experimental site (Faaba) and at the station at Ina (TZEE, cowpea and groundnut varieties) were also visited. They were very well maintained and enough seed for the next growing season can be expected.

### ii. Appropriateness of the activities in meeting farmers' needs

The lack of seed considerably reduced the number of trials expected to be implemented this year by the scientists. This is expected to be alleviated next year with the production of seed necessary for the trials.

The technology and the activities are well within the expectation of the farmers in terms of solving their problems of improved and adapted varieties as well as seed availability.

Farmers expressed a need for the trials to be implemented early in order to avoid the problem of land allocation. They seemed eager and very enthusiastic about the new varieties of groundnut and cowpea which will be introduced to them next year.

### iii. Farmer access to trials

The number of trials and their spatial repartition (close to roads) made access to these trials by farmers a lot easier. The trials were for the most part well localized to allow access by other farmers. However, more publicity is needed, for farmers to know the existence of these trials in order to visit. No real estimate is available on the number of farmers who visited the trials.

Planting was spanned over a large period of time making the organization of a field day difficult. The scientists have decided to plan restitution workshops with the farmers after harvest.

### iv. Partnerships in trial implementation

In Benin, the Centre d'Action Regional pour le Developpement Rural (CARDER) is in charge of extension and some of the farmers were selected in collaboration with CARDER, therefore, increasing the chances of visitation by other farmers.

**Constraints in trial implementation**

Some of the farmers involved in trial implementation are also involved with other field demonstration activities. This caused a problem of land and labor availability for these particular farmers.

**Recommendations**

In general, it can be stated that the advance in trial implantation is positive. During our visit, farmers were able to make a choice on the varieties based on plant development and expected yield. All the farmers who visited liked the collaboration with INRAB and expressed their desire to continue with the trials in the coming year. The following recommendations at address some of the shortfalls.

Farmers should be followed to make sure the recommendations are implemented particularly in terms of fertilizer application and weeding.

It may be advisable to avoid crowding farmers with multiple demonstration trials. This will avoid labor and space availability problems. With that in mind, care should be exercised when selecting farmers at Bagou for the legume demonstration trials.

As much as possible, demonstration fields should be kept near the roads to facilitate access by other farmers.

**Improvement of the productivity and sustainability of cereal/legume based farming systems through agriculture livestock integration: A strategy for food security in Sahelian and Soudanian zones of Burkina Faso**

## Introduction

Poor soil fertility and low rainfall are the major stumbling block to the development of agriculture in Burkina Faso. In the north (Sahelian zone) annual rainfall vary from 300 to 600 mm, while in the Soudanian zone it varies from 600 to 1000mm. The main activities are agriculture and animal production. Livestock rearing is done mostly through free ranging with little grass available to animal during the dry part of the season. Extensive rainfall agriculture is predominant in this region with very little input of fertilizers while the soils are deficient in phosphorus, nitrogen, potassium, and organic matter.

Through participative farming system research, INERA has developed technological packages (improved varieties, soil water retention, organic and mineral fertilizer, fodder production and storage, animal feeding).

The objective of this project is to verify on farmer fields, technology packages for cereal/legume production system which integrate livestock rearing for sustainability, improved productivity, and increase in farmer income.

Four regions were designated for sustainable agricultural development program implementation. Thiougou and Thiano in the sudan savanna zone and Pobe in the sahelian zone, and Donsin in the Central Plateau. Monitoring visit was done in all the regions except the Sahelian zone.

**Activities undertaken**

At Pobe Mengao, Tiano, and Thiougou, the technology package tested consisted of improved varieties of sorghum, millet, and maize, cultural practice (rotation or intercropping) and water retention practices (tied ridges).

**Trial design**

Tiano, Maize based system with the use of maize variety SR 21.

Three treatments were used per trial:

Treatment 1A: SR21 + 2.5 t/ha manure + 200 kg/ha natural phosphate+ 100 kg/ha NPK with furrow (tied ridges). To be rotated with sole cowpea crop the second year.

Treatment 1B: SR21 in association with Kvx 414-22-2 (2/1) + 2.5 t/ha manure+ 200 kg/ha natural phosphate + 100 kg/ha NPK

Treatment 2:-Farmer variety + 2.5 t/ha manure + 200 kg/ha natural phosphate+ 100 kg/ha NPK with furrow (tied ridges)

Treatment 3: Farmer variety under farmer management practices

Each farm had treatment 2 and 3 and treatment 1A or 1B, but not both. Farmers were selected so that half conducted treatment 1A and half treatment 1B.

The same basic treatments were used for Thiougou and Pobe with the following exceptions:

- The cereals used were sorghum (var Sariasso 14) and millet (var IKMV) at Thiougou and Pobe, respectively
- Cowpea varieties used were IAR 7/180 and KVX 396-4-5-2D at Thiougou and Pobe, respectively
- NPK was not applied in the two regions

In these three region, a total of 36 on-farm trials were implemented.

In the Central Plateau, the technology package consisted of soil fertility management alternatives (cereal/legume rotation with/without manure) and improved millet varieties. Participating farmers practiced cowpea and millet production, in integration with small ruminant fattening. Fifteen farmers from four farming communities were selected for the activities. Each farmer implemented a trial consisting of the following treatments:

2 plots of improved millet variety (IKMP 5)

2 plots of local millet variety

2 plots of improved cowpea variety (KVX 414-22-2)

Plots were 100 m2 each.

Continuous monocropping will be practiced on half of the plots while rotation with cowpea will be practiced on the second half.

**Training**

Training activities undertaken at Tiano and Thiougou included the training of all participating farmers in small ruminant fattening. This activity was undertaken in collaboration with the Department of Animal Production of INERA. It included themes like fodder harvest and storage, animal selection, and animal shed construction. Training was also planned for Pobe Mengao by end of November 2000.

Composting is already practiced by some of the farmers who will receive further training and serve as trainees for the others.

**Farmer field day**

Field visits were held for Tiano and Thiougou (October 21, 2000). This field visit was attended by more than 60 farmers and the extension service. During this visit farmers exchanged about the techniques as well as the methods used for implementing. A field day was organized also on October 5, 2000 at Donsin. It was attended by over 13 collaborating scientists and technicians from INERA and SAFGRAD and agricultural and animal extension agents of the region.

**Planned activities**

Small ruminant fattening activities is already underway at Donsin. Ten Out of the 15 participants had already parked 5-10 sheep and started the deworming, vaccination and feeding process. In the other three regions, this activity will start by end of December. Fodder has already been harvested and stored.

**General Observations**

In the region rainfall was very erratic during the growing season. This caused late planting, particularly at Pobe Mengao and Thiougou where planting was done even after July 25. Reseeding was necessary at all sites.

At the time of our visit to Tiano, maize was mature and ready for harvesting. Farmers seemed to prefer SR 21 for its higher yield compared to the local variety. As far as water retention technology, maize in the tied ridges had better growth, development, and ear setting (quantity and quality) than the farmer management, according to the farmers.

At Thiougou, only two trials were visited due to time constraints. Sariasso 14 had very good growth and development, but grain setting was bad because of **cecydomy** attack caused by the early planting. Furthermore, no grain will be harvested on this variety. Farmers, however did appreciate the water retention treatment because of greener leaves, better plant stand, and higher and bigger spikes. They expect this treatment to outyield the farmer management plots. Farmers also followed very well the cultural management practices. The fields were well maintained and thinning was done 15 DAP and tied ridges at 30 DAP.

In Donsin, the rainfall was less than optimal causing a delay in planting as well as plant development. However, farmers expressed their positive appreciation of the improved millet variety which should outperform their local varieties. In addition, severe attacks of striga were noticed on the plots. The plots were well maintained.

Constraints listed by farmers in the trial implementation included: the need to acquire animal traction in order to successfully accomplish the activities and the non availability of manure.

### ii. Appropriateness of the activities in meeting farmers' needs

The number of regions, villages as selected cover a large portion of the agro-ecological zones of Burkina Faso. The themes selected (water retention, improved variety, and soil fertility management) are among the key issues of concern to the participating farmers. When presented with the alternatives through the trials, farmers seem to prefer the tied ridges, but claim on the additional time and labor necessary for its implementation. Farmers were curious enough to share some of the improved seed with non participating farmers. The high degree of active involvement of the farmers also indicates the importance of the activities into solving farmers' problems.

### iii. Farmer access to trials

Farmer access to trials was greatly enhanced by the organization of field days before harvest at all the sites. At Thiougou, more than 60 farmers visited different farms where the technological options were implemented and they compared the results.

### iv. Partnerships in trial implementation

Activities were implemented in coordination with extension service of the ministry of Agriculture who took an active role in the selection of participating farmers. The livestock extension services is also scheduled to play a key role in the implementation of the small ruminant fattening portion of the activities. Within INERA also, the activities requires the collaboration of several departments among which the plant production and the animal production.

### Recommendations

While most of the data were collected by the scientists in charge, there is no soil samples collected as specified in the proposal. This should be done at least for the second year of the project, if the effect of the technology on soil fertility management is to be monitored.

Optimum planting date of the new variety of Sorghum (Sariasso 14) should be proposed to farmers in order to avoid cecydomy attack.

Farmers have also expressed a need for new varieties of groundnut and cowpea.

## Annex 1: Cereals-legume crop rotation integrated with small ruminant production in the north west zone of Nigeria

INTRODUCTION

The cereal-legume rotation integrated with small ruminant production is a project aimed especially at providing farmers with basic food grains, improve soil fertility and promote livestock production through small ruminant fattening in order to enhance sustainability of the production system and farmer income.

Awareness creation among the stakeholders – extension and farmers was done though visits of the team members to the state extension agencies and farms in early June.

### Technologies Tested

Two technologies were tested; one for each state. In Katsina state – the technology consisted of millet in rotation with cowpea integrated with sheep/goat production (12-15 heads per household).

| | | |
|---|---|---|
| Variety of millet used | - | SOSAT 88 |
| Variety of cowpea | - | IT96D 757-SR |
| Location of trial | - | Sudano-Sahelian region |

**Villages:**

| | | | | |
|---|---|---|---|---|
| Tsohon gida | - | 1 farmer | - | 2 km from Katsina |
| Barhin | - | 3 farmers | - | 5-6 km from Katsina |
| Sinkafi | - | 1 farmer | - | 10 km from Katsina |
| Dutse safe | - | 7 farmers | - | 7 km from Katsina |
| | | 12 farmers. | | |

| | | | | |
|---|---|---|---|---|
| Farm size | - | 50 x 50 m | - | 0.25 ha |
| Date of planting | - | 3 – 13 July 2000 | | |
| Weeding | - | 9th – 15 July 2000 | | |

| | | | | | |
|---|---|---|---|---|---|
| Fertilization | - | 11th July | | | |
| **Kano State** | Technology is sorghum rotated with groundnut and integrated with sheep/goat production. | | | | |
| **Crop variety** | Sorghum | - | ICSV 111 | | |
| | Groundnut | - | Ex-Dakar | | |
| **Location** | Dawaciki | - | 5 farmers | - | 10 km from Kano |
| | Dambatta | - | 5 farmers | | |
| Planting | 9th – 21 July 2000 | | | | |
| Weeding | 24th July – 4th August 2000 | | | | |
| Fertilization | August 10th – 15th 2000 | | | | |
| Spraying | Done | | | | |

Soil samplings were done from individual farmer's plots and samples are being prepared for analysis.

## Livestock component

All the farm households were told to keep a minimum of 12 sheep/goats for fattening. The veterinary and housing schedule as well as feeding regimes are yet to commence.

## Problem of Implementation

1. The basic problem was the length of time taken to clear the check – The check was received and paid on May 26th and cleared only on September 8th 2000 – after almost 3 ½ months. This seriously affected the take off and continuation of the work according to the proposal plan as the team had to resort to borrowing money and buying on credit to execute the project.

2. Weather – There was delayed rains in the project areas at the beginning of the season as well as a dry spell (drought) in late August/early September up to 10 days in some areas. This affected the crops, especially sorghum.

3. Insect/Disease: - The dry spell caused insect attack (aphids) on cowpea and groundnut which somehow affected their establishment. They were controlled by spraying karate and insecticide.

## Prospect and Impact

The farmers were very much interested in the technologies especially since feed implementation was part of them. The new crop rotations were early maturing and in spite of late planting and the dry spell, were able to perform well. Therefore, the technologies have a good prospect of being adopted because of the positive impact they have on food and livestock production as well as farmers' income.

The other components will be executed as planned.

## Research Team

Dr. Ben Ahmed (Economist and Leader)
Prof. J.P. Alawa(Animal Scientist)
Dr. Y. Amapu (Soil Scientist)
Dr. A. Lamido (Agronomist)
Dr. S.B. Tarfa (Extensionist).

## Partners

Katsina State Agricultural Development Project
Kano State Agricultural and Rural Development Project

## Annex 2: People contacted during the visit

### Niger

| | |
|---|---|
| Jika Naino: | Millet/Maize breeder |
| Adamou Moutari | Cowpea breeder |
| Moustapha | Scientific Director |
| ... | Director General, INRAN |
| Boureima Mousşa | Socio-economist, DECOR,INRAN |
| Boubacar Abdoulaye | PRIVAT project, Niger |
| Issaka Bobawa | Technician cowpea program |
| Mahamadou Malam Abdou | Head Station of Konni, INRAN |
| Illa Baoua | Extension Agent, Konni |
| Amadou Narhaga | Cowpea producer, Guidam, Konni |
| Hayat Aboubacar Jean | Cowpea/millet producer, Guidam, Konni |
| El Hadji Issiaka Issan Taba | Producer, Konni |
| Yao Moli | Producer, Kollo |
| Hama Sadou | Producer, Kollo |
| Hama Adamou | Maize producer, Kollo |
| Mahamadou Adamou | Extension agent, Koure/Dantchandou |
| Boubacar Konda... | Extension agent |
| Women Group | Gardjigue |
| Women Group | Banimouzoumou, Sine Kouara |
| Kodini Aboubacar | Cowpea producer, Takoro, Konni |

### Ghana

| | |
|---|---|
| Victor Clottey | Agronomist, SARI |
| Salifou A. B. | Director, SARI |
| Paul B. Tanzubil | Entomologist, Managa, SARI |
| ...Jeffrey | Technician, Soil Science, Manga, SARI |
| P. Terbobri | Socio-economist, Manga, SARI |

| | |
|---|---|
| 15 Producers in the 2 villages | Kodouguziego & Tindang |
| Abdul-Mannan Shaikanao | Subject matter specialist Livestock, Tolon Center |
| A. Addo Kwafo | Aminal Scientist, ARI, Tamale |
| Producers at Bindure | |
| Marhark S. Abdulai | Maize breeder, SARI |
| Francis A. Tuor | Weed Scientist, SARI |
| Nicholas N. Denwar | Soybean/cowpea breeder, SARI |

## Togo

| | |
|---|---|
| M'Po Batoussi | Regional Director ITRA, Kara |
| Koussa Dissirama | |
| Lare Tchinliak | |
| Amadou Ali | |
| Adam Fousseni | DG, ITRA, Lome |
| Kodjo Tetevi | Scientific Directeur, ITRA, Lome |
| Ngolo Sambiene | Producteur, Nalong |
| Lamboue Kolani | |
| Konkess Nanga | |
| Lare Tekiname | Producer, Gabongbong |
| Kombate Wandja | Producer Naki-Ouest |
| Tchami Tchumbi | Directeur Regional de l'Agr, Ele et Peche, Dapaong |
| Tchengue Fintibe | Conseiller ICAT, Sissiak |
| Kolane Napak | Conseillet ICAT, Naki Ouest |
| Gwentare Kombien | Producer Sissiak |

## Benin

| | |
|---|---|
| Jean Detognon | DG INRAB, Cotonou |
| David Y Arodokoun | Scientific Director, INRAB, Cotonou |
| Yallou Chabi Gouro | Chef de Station Ina, INRAB |
| Sanni Ogbon Abou.. | Chef programme legumineuse |
| Gbehounou Gualbert | Weed Scientist, INRAB, Cotonou |
| Dossou Soignon Codjo | Technician Legume program |
| Andebou Nestor | Technician maize program |
| Gombe Bio | Producer, Thui |
| Issa Moukaila | Producer |
| Amadou Issa | Producer |

| | |
|---|---|
| Adam Congo | Producer Bagou |
| Bio Nikki Karim Tassou | Producer Bagou |
| Salamata Boukare | Producer Sokka |

## Burkina Faso

| | |
|---|---|
| Taonda Jean Baptiste Sibiri | Socio-economist, INERA, Saria |
| Zoundi Jean Sibiri | Zoootechnician, INEAR, Ouaga |
| Kazinga Amado | Producer, Tiano |
| Participating Farmers at Thiougou | |

**Annex 3: Itinerary of the monitoring tour**

| Date | Activities | Team members |
|---|---|---|
| 11 September | Arrival in Niamey | M. Ouedraogo |
| 12 September | Visit DG INRAN<br>Visit DÉCOR | |
| 13 September | | |
| Morning | Visit Kollo, Koure (cowpea) | |
| Afternoon | Visit Kollo (maize) | |
| 14 September | Departure for Konni<br>Visit in Konni, Takoro (maize & cowpea) | |
| 15 September | Visit Konni (maize)<br>Departure for Niamey<br>Visit Scientific Director INRAN | |
| 17 September | Departure for Ouagadougou | |
| 24 September | Travel to Tamale | M. Ouedraogo, A. Ouattara |
| 25 September | | |
| Morning | Visit Director SARI & Research Station | |
| Afternoon | Visit Striga activities at Tingoli and Kpalaga | |
| 26 September | Visit Tindang and Kodouguziego | |
| 27 September | Travel to Manga<br>Visit Bindure | |
| 28 September | Travel to Ouagadougou | |
| 1 October | Travel to Dapaong | M. Ouedraogo |
| 2 October | Visit Nabong, Nanki Ouest and Gabongbong | |
| 3 October | Visit Sissiak<br>Visit ICAT and Regional Director Agriculture, livestock and Fisherie<br>Travel to Kara | |
| 4 October | Travel to Lome | |
| 5 October | Visit DG ITRA<br>Visit Rape mobile<br>Departure to Cotonou | |
| 6 October | Visit DG INRAB<br>Departure to Ina | |
| 7 October | Visit Angaradebou, Thui, Bagou | |
| 8 October | Visit Sokka<br>Departure to Cotonou | |
| 9 October | Meeting with Gualbert | |
| 10 October | Departure to Ouagadougou | |
| 17 October | Visit Tiano, Burkina Faso | M. Ouedraogo, A. Ouattara, N. Mubela |
| 4-15 September | Visit Nigeria | Taye Bezuneh |

2000

# Implementation Report of the Sustainable Agricultural Development Program

OUEDRAOGO, Mahamat

AU-SAFGRAD