RÉSEAU NIÉBÉ D' AFRIQUE CENTRALE ET OCCIDENTALE

RENACO

WEST AND CENTRAL AFRICA COWPEA NETWORK

Proceedings

of the

Planning Meeting 1994/95

12-13 September 1994

Ouagadougou, Burkina Faso

Funded by

United State Agency for International Development (USAID)

International Institue of Tropical Agriculture
Ibadan, Nigeria

October 1994

CONTENTS

1.	**Opening Session**		1
	1.1	Welcome	1
	1.2	Review of the period April 1993 to September 1994	1
2.	**Country Reports, Other Reports**		4
	2.1	Introduction	4
	2.2	Country/Status Reports	5
		2.2.1 Burkina Faso	5
		2.2.2 Benin	5
		2.2.3 Cameroon	6
		2.2.4 Ghana	7
		2.2.5 Niger	8
		2.2.6 Nigeria	10
		2.2.7 Mali and Senegal	10
		2.2.8 IITA Reports	10
		2.2.9 Synthesis of main points arising from country/ status reports	14
	2.3	Discussion	17
		2.3.1 Topics	17
		2.3.2 Technical details	17
		2.3.3 Discussions relating to future strategy	19
3.	**Short Term Plans (1994/95 Program)**		22
	3.1	Rationale	22
	3.2	Proposed Activities and Justification	22
		3.2.1 Variety testing on farmers' fields	22
		3.2.2 Seed multiplication	22
		3.2.3 Storage	22
	3.3	Country-Specific Details	23
		3.3.1 Burkina Faso	23
		3.3.2 Benin	23
		3.3.3 Cameroon	24
		3.3.4 Ghana	25
		3.3.5 Niger	25
		3.3.6 Nigeria	26
	3.4	Cross Country Comparisons and Synthesis	26

4. **Longer Term Research Plans** 29
4.1 Introduction 29
4.2 Country-Specific Details 29
4.2.1 Burkina Faso 29
4.2.2 Benin 30
4.2.3 Cameroon 30
4.2.4 Ghana 31
4.2.5 Niger 31
4.2.6 Nigeria 32
4.2.7 Discussion 33
4.3 Longer Term RENACO Strategy 34

5. **Budget and Action Plan** 35
5.1 Budget Considerations 35
5.2 Action Plan 35

Tables

Table 1 Adaptive Research Activities - main area of emphasis as specified by RENACO member countries for their individual 1995 season programs.

Table 2 Longer Term Research Plans - main problems to be addressed as specified by RENACO members for national cowpea research programs

Table 3 RENACO Planning Meeting, 12-13 September, 1994

— Summaries: A. Agreed Short and Long Term Research Agenda

B. Action Plan

Annexes

A. List of Participants
B. RENACO Planning Meeting Agenda
C. IITA Internal Memo - Follow up note on RCMD-SARI meeting, Ghana
D. Country Reports - Benin, Cameroon, Niger

Acronyms and Abbreviations

1. OPENING SESSION

1.1 Welcome

Speaking on behalf of the National Institute of Agricultural Studies and Research (INERA) and the Ministry of Scientific Research and Higher Education of Burkina Faso, Madame C. Dabire (Head of the Cowpea Program, INERA) warmly welcomed all participants to the RENACO Planning Meeting.

Dr T. Bezuneh, the Director of Research of OAU/STRC-SAFGRAD expressed pleasure that the RENACO Meeting was taking place. He reminded all participants of the earlier successful operation of RENACO under the SAFGRAD project and was confident that RENACO's program would continue to make a valuable contribution to regional research and development activities for cowpea. On behalf of OAU/STRC he welcomed all participants and looked forward to a successful two day meeting.

1.2 Review of the period April 1993 to September 1994

Professor Emechebe (Deputy Director Research, IAR, Nigeria) reported on some events concerning RENACO that had occurred during 1993/94. He began by recalling the impact assessment study of the SAFGRAD project which took place in 1993[1]. RENACO had received a highly favourable review in respect of economic impact, technology development and transfer, and human resource development in NARS. In spite of this, USAID had decided to withdraw their support to RENACO, and favoured the formation of a new network for natural resource managment. Whilst RENACO members had managed to have some activities during 1993, USAID's decision had seriously curtailed the network's operation and by the ending of the year, prospects for RENACO's continuing existence were bleak.

Since the opening of IITA Kano station in 1990, cowpea research scientists of IITA and Nigerian NARS based at IAR in Zaria and Kano have met annually for a pre-season mutual review of their progress and

---

[1]Sanders J.H. *et al* (November 1993). Impact Assessment of the SAFGRAD Community Networks. USAID/AFR, OUA/STRC-SAFGRAD

forward plans. At the 1994 meeting, IAR staff expressed their concerns over the demise of RENACO activities and asked IITA staff to brief them on USAID's plans. It so happened that USAID staff had recently visited IITA and networks had been discussed. IITA was therefore able to report that USAID was still considering the formation of a Resource Management Network but nothing definite was in place as yet. At the IITA-IAR meeting, it was fortuitous that a broad range of scientific disciplines were represented. Staff from ILCA were also there, such that crop-livestock aspects of cowpea were covered. As the meeting proceeded, the technical content of the various presentations had served to re-emphasise the multipurpose role of cowpea in the farming systems of the dry lowland savannas of West and Central Africa. Its importance as a farm household food, both for humans and livestock, and as a cash crop (grain and fodder) was evident. In addition, the several ways in which the crop contributes to natural resource management were covered (— soil N conservation or even improvement, some soil organic matter return, provision of ground cover thereby assisting weed and soil erosion control and, for some cultivars, acting as a false host for the parasitic plant of cereals, *Striga hermonthica).*

In the wrap-up session IAR staff had specifically asked IITA to communicate these technical points to USAID. Going on from this, and bearing in mind that USAID was still prioritising resource management, it should be argued that cowpea is the pivotal crop in the farming system by which the technical area of resource management could be addressed at the farm level. IITA was asked to stress this view point.

As requested, IITA had written to USAID and the outcome had been positive. USAID had provided a budget of $75,000 for the financial year 1994/95 for the continuation of RENACO's activities. The purpose of the present two day meeting was therefore to review the status of current cowpea work in the RENACO member countries, and decide on the main technical areas of work that should form RENACO's program for 1994/95. In addition, since USAID had given RENACO members the opportunity to meet and make plans, a longer term strategy for both cowpea and resource management research and technology transfer should be discussed.

Professor Emechebe concluded by expressing his thanks on behalf of RENACO, for IITA's follow up and USAID's generous provision of funds.

Speaking on behalf of IITA, Dr F. M. Quin (Director of the Crop Improvement Divison) expressed the Institute's great pleasure that the RENACO Planning Meeting was taking place, and gratefully thanked USAID for their support. As follow up to Professor Emechebe's remarks, she reported that IITA was pleased to have had the opportunity of bringing NARS views to the attention of USAID. The successful outcome of that action was gratifying. The important responsibility now, for all participants in the RENACO Meeting was to review progress, decide future priorities and agree to a plan of action. With a total budget allocation of $75,000, the main budget categories for NARS were:

	$
Planning Meeting	7,600
Monitoring Tour (1995 field season)	4,700
Field Program	50,000

The remaining portion ($12,700) would cover coordination and administrative support costs.

With good planning and execution of agreed work plans, she had the expectation that RENACO's program would provide the basis for formulation of a larger regional program on resource management.

2. COUNTRY REPORTS, OTHER REPORTS

2.1 Introduction

The Chairman of the session provided a guideline for the country presentations. The report should summarise the current situation at national level of cowpea research and technology transfer emphasising:

- What are the national priorities
- What is the financial situation
- With respect to RENACO, in which areas do you wish to focus

As a precursor to the Country Reports, the Chairman of the RENACO Steering Committee reported so as to bring all Steering Committee members up to date. The main points were:

1. The achievements of RENACO to year end 1992 are well documented. Professor Emechebe had mentioned the impact assessment report and there is also the RENACO final report for the previous phase of USAID funding.[2]
2. The last Steering Committee meeting was held in February 1992. RENACO had managed to have some activities in the 1993 season and an ad hoc meeting of the Steering Committee was held in May 1994 to discuss a possible way forward without USAID funding.
3. Two countries had found some donor funding but not others. Overall, the loss of regional contact had been noticed and regretted.
4. Therefore, it was very pleasing to be having the present meeting and thanks were extended to USAID for their renewed support.
5. RENACO members had proved themselves in the past and should be able to perform well in the future. Indeed, it could be envisaged that the cowpea network would be the nucleus from which a resource management network could evolve.

Country reports followed by reports from IITA research divisions were then presented.

---

[2] RENACO Final Report 1987-1993. OUA/STRC-SAFGRAD II/IITA, Ibadan, Nigeria. April 1993

2.2 Country/Status Reports

2.2.1 Burkina Faso (C. Dabire)

INERA has a multidisciplinary team for cowpea improvement covering breeding, entomology, pathology and socio-economics. Research focuses on development of low-cost, low input technologies including less requirement for pesticides, *Striga* resistance and improved resistance to storage weevils. They have made progress in breeding for insect resistance and currently are emphasising resistance to pod sucking bugs. In respect of cowpea diseases, they are working on *Cercospora* control (emphasising less use of fungicides), and are conducting a census of viral diseases.

They recognise the importance of technology dissemination and therefore have made efforts to increase on-farm trials. Similarly, they engage in seed multiplication and recognise that it is an important service. Since seeds are distributed throughout the country, and even to other countries, seed health is also a component of the program.

With regard to national production, the cropped area of cowpea has increased since the CFA devaluation.

2.2.2 Republic of Benin (A. O. Sanni)

Their program falls into three parts, — the national program activities, collaborative work with IITA, and the RENACO component.

Cowpea is an important crop offering several possibilities. It provides a protein rich food in the diet of the farm family and at the same time is a cash crop. Nevertheless, there are major constraints to production of which the main ones are insect pests in the field and in storage, *Striga* (which is a scourge in the centre of the country) and marketing problems.

Some varieties have been disseminated to farmers. In addition, cowpea researchers have found out about farmers' preferences and have made crosses to local varieties so as to develop varieties to suit local needs. The trials program is conducted on-station and also on-farm. Through the on-farm program, farmers actually see the products of research work. Seed production is undertaken.

Research covers breeding for insect and *Striga* resistance, determination of minimum levels for pesticides, and intercropping (particularly time of planting relative to cereals). The program has links with a food technology laboratory for determination of the cooking and eating qualities of new varieties and socio-economic studies are conducted.

Through links with IITA and RENACO, they have evaluated varieties (covering maturity groups, insect resistance and *Striga*) and have conducted trials concerning adaptation to difference agroecological zones. Overall, the program has many achievements to its credit including variety development and release, crop protection, and production recommendations for each agroecological zone in Benin. Both the financial and material support of RENACO and IITA have contributed to this progress, but certain problems and challenges remain. Insect pests and *Striga* are still outstanding problems for which combined and continued breeding efforts and further development of integrated crop management packages are essential.

In addition, seeds and marketing services need to be improved. Government needs to be convinced of the importance of these services since they are factors which seriously impinge on prospects for further increases in cowpea production.

2.2.3 Cameroon (C. Endondo)

About 70 percent of cowpea in Cameroon is grown as an intercrop in association with sorghum and/or millet. Production constraints are poor rainfall and poor soils, pests, inherent low yields of local varieties, lack of availability to farmers of improved varieties, lack of improved systems for cowpea production. The cowpea program aims to address these constraints through variety evaluation and selection, agronomic studies (especially tied ridging), on-farm testing, pest studies including post-harvest storage.

Projects and institutional links have assisted the program. A university project concentrated on storage and developed some low cost storage methods. Other projects were NCRE (USAID) and the Garoua

project (with french funding). The program works with IITA and until last year, also with RENACO.

They have made selections from IITA varieties. Evaluations are conducted in sole crop and intercrop conditions with sorghum and cotton. Pesticides which are used for cotton assist insect control in cowpea. Variety evaluations are conducted on-farm. Some farmers produce cowpea in monocrop and fertility trials, focusing on phosphorus are conducted for this production system.

Quality is an issue. Farmers preference is for large white grains. Fortunately, suitable grain types were available in IITA materials. Not all the IITA materials are readily suitable but they are useful because of certain genetic characteristics and they are utilised for these. Recently, a variety released in 1984 was losing its stability owing to viral diseases. Efforts are being made to clean up this variety.

Improved low cost storage methods have been developed and the main emphasis now is the extension of these methods.

In agronomy, more work is needed on sorghum-cowpea intercropping, aimed at improving the production system.

Achievements from past projects e.g. the Garoua project, have had a wider impact, going beyond northern Cameroon. Findings were relevant to cowpea production in Chad and CAR, and through collaboration, technology has moved out.

Current problems centre on loss of funds because of loss of donor supported projects. As a result, many activities have been curtailed. The hope therefore is that RENACO can revitalise at least some part of the research program.

2.2.4 Ghana (K. O. Marfo)

In Ghana there are two main groups working on cowpea, — the Ghana Grains Development Project (GGDP) in the south, based at CRI, Kumasi and the research team at the Savanna Agricultural Research Institute (SARI) at Nyankpala. Whilst these groups operate independently, there are cross linkages through the nationally coordinated cowpea trials. In the

past, RENACO assisted this north-south linkage and as a result, cowpea breeding materials were exchanged.

The research program has concentrated on pest and disease resistance. At the same time, it was realised that there were some information gaps which weakened decision-making on research priorities. To correct for this, socio-economic studies were undertaken to determine farmers' preferences and the reasons behind their production strategies.

Overall, the focus remains as crop improvement. *Striga* is a problem for which resistant lines from the IITA and Burkina Faso programs have been used. Shorter crop duration is a strategy for avoiding insect attack and shorter duration germplasm (40-43 days to maturity) has been identified which has been used to manipulate duration.

Cowpea entomology work concentrates on thrips and pod-sucking bugs. Seed preservation studies have evaluated some natural products e.g neem, pepper. For diseases, a virologist and pathologist have been recruited and currently are conducting a disease survey. Heat tolerance is another area of attention in the breeding program. Work on dual purpose varieties is linked with livestock feeding trials in which soybean, quality protein maize and cowpea are compared.

Cropping systems research has shown that cowpea is the best preceding crop for maize, as compared with other grain legumes (soybean and groundnut).

The research program also assists with the organisation of seed production. There is a scheme whereby farmers undertake seed multiplication which combines with localised marketing and sale. Seed quality is monitored to a locally acceptable standard.

2.2.5 Niger (M. Adamou)

Cowpea is the principal food legume of Niger. Estimated cropped area is 2.6m hectares (1991 statistics), placing it second to pearl millet (4.4m hectares cropped area). Annual national production is around 430,000 tonnes. Productivity is relatively poor, with an estimated grain yield of less than 200 kg/ha.

Cowpea plays an important role in human food security as well as being a source of protein. It is also a cash crop and is exported to Nigeria and Benin. It provides feed for livestock and contributes to maintenance of soil fertility and reduction of soil erosion.

The main causes of poor grain yields are the severity of insect pests (particularly aphids), diseases and *Striga* combined with problems of infertile and degraded soils and drought. The crop is mainly grown as an intercrop and low plant densities also contribute to the poor yields. Manuring is sometimes practised. Inadequate seed supply and marketing weaknesses also are problem areas.

The main aims for cowpea are to improve productivity and to increase the value of the crop products. To achieve these aims, a multidisciplinary research approach is used, working in collaboration with other research organisations (e.g IITA, RENACO, the University of Maradi, Niamey), and with development agencies (extension services, NGOs, agricultural development projects) and farmers.

The approach focuses on improvement of production in intercrop and pure crop systems with major emphasis on pest control. As a result of a recent restructuring exercise within INRAN, on-farm trials as a means of increasing dissemination of results will receive more emphasis.

The main achievements to date are:

- Maintenance of a rich collection (some 500 accessions) of local germplasm
- Improvement and release of both improved local varieties and exotic varieties
- In entomology there are significant achievements in deployment of aphid and bruchid resistance, and demonstration of significant reductions in flower thrips damage through millet-cowpea intercropping and associated maintenance of natural enemies
- An extensive survey (1335 farmers in 153 villages) of storage problems has been conducted. This provides a basis for disseminating new methods of seed storage and conservation
- Identification of materials which can be used as sources of resistance to *Striga* and selection of two varieties for direct release as *Striga* resistant
- Screening of materials for *Macrophomina* resistance (although reliable sources have not yet been identified)

- Agronomy trials have generated recommendations for intercrop and sole crop production in respect of sowing dates, plant densities and crop maturity group
- Processing methods have been studied in several regions. Findings provide a basis making further improvements in nutritional quality.

2.2.6 Nigeria (O. O. Olufajo)

The cowpea program covers the forest and the savanna, with main emphasis on the savanna zone. The research approach is multidisciplinary, and plant breeding recently was strengthened. *Striga* , bacterial blight and dual purpose plant types are prioritised. There is an on-farm testing program in addition to the on-station research.

In plant pathology, *Septoria* , bacterial blight and scab are studied which links with the development of multiple disease resistance. Materials which were entered in the RENACO trials have been screened. Fungicides have been evaluated for disease control, including seed treatments.

In agronomy, the effects of N, P and K on the incidence of *Striga* and *Alectra* were studied. Entomology has concentrated on the use of botanicals for insect control.

The program is responsible for the production of breeder seed and foundation seed. Four varieties are currently under multiplication.

2.2.7 Mali and Senegal

On behalf of Senegal, Dr Bezuneh reported that Senegal wished to continue participation in RENACO. There was no information regarding Mali.[3]

2.2.8 IITA reports

Cowpea breeding program (K. Dashiell)

The program has three main components:

---

[3] Unfortunately, notice of the change of venue was received too late for Mali to mobilise. As with Senegal, they would like to participate (pers, Comm. NARS to IITA)

- Conventional breeding (GLIP, based largely at IITA's Kano station)
- Biotechnology (BRU, IITA Ibadan)
- Wide crossing (GLIP, IITA Ibadan)

The team at Kano is both interdisciplinary and inter-institutional with the participation of IAR and ILCA. The program focuses on the improvement of local varieties through introgression of genes for resistance to pests, diseases and parasitic plants (*Striga gesneriodes* and *Alectra vogelii*). In the near future, screening for the ability of breeding lines to act as a false host to *Striga hermonthica* will be included.

To fulfil IITA's global responsibilities for cowpea improvement, exotic improved varieties (characteristically day length neutral with erect, determinant habit) are also developed.

A survey of local farming systems was conducted in 1992-93 in the Sudan savanna (Kano area). This has assisted the program with priority setting, and in the development of field screening methods for the improved lines. The program has also introduced farmers' participatory research for evaluation of new materials. Whilst current results demonstrate that improved locals perform well, grain yields are still relatively low. But progress is being made, — indeed farmers are recognising the favourable traits in the improved materials e.g aphid and bruchid resistance.

The main aim of both the biotechnology and wide crossing programs is development of resistance to post-flowering insect pests. Biotechnology is concentrating on genetic transformation. IITA has both good links and collaborative projects with advanced laboratories in Europe and USA who are working in this field. The wide crossing program concerns the transfer of genes for insect resistance from wild *Vigna* species. Suitable culture media for embryo rescue have been developed. Susceptible and resistant accessions have been identified in *Vigna oblongifolia* and a crossing program is now underway to study the inheritance and molecular basis of the resistance to *Maruca* pod borer in this species. From the F_1 progeny of the cross *V.unguiculata* x *V.rhomboidea*, F_2 seed has been obtained. This opens the way for further crosses to species of wild *Vigna* .

Cowpea entomology (L. Jackai)

In the breeding program of both IITA and certain NARS, there has been progress in development of varieties with resistance to aphids and bruchids. Whilst post-flowering insect pests remain as a major problem, there is good progress to report in this research area.

In cowpea, host plant resistance is the central focus for insect control because sustainability is more assured with this technology. In addition there are some possibilities for biological control and, as a components of a technical package, intercropping and certain husbandry practices can assist insect control.

It has been demonstrated that certain cowpea materials have low levels of resistance to post-flowering insect pests. The challenge now is to make further improvements. Although the wild species, *V.vexillata* is resistant to every cowpea pest, the problem is that this species has never been successfully crossed to cowpea *(V.unguiculata)*. Therefore, IITA has turned to biotechnology in order to access the resistance genes which are available in *V.vexillata*. A crossing program within another wild species, *V.oblongifolia* is assisting research on the identification of insect resistance genes (as was described earlier). Within a time frame of two years, IITA aims to identify the genes conferring insect resistance, particularly those for *Maruca* .

In parallel with this, we are screening commercial genes and related gene products e.g B_t, PAPA with the longer term aim of using genetic transformation techniques to incorporate insect resistance genes into cowpea.

Moist Savanna Program (MSP) (R. Carsky)

The Moist Savanna Program (MSP) of the Resource and Crop Management Division (RCMD) is concerned with the major cropping systems in the moist savanna which are cereal and tuberous root based. The many possible contributions that cowpea can make to these cropping systems are recognised. Besides the most important which is human food they are: animal food, soil organic matter and/or N supply, ground cover

for weed suppression and erosion control and possibly acting as a false host for *Striga hermonthica* which parasitises cereals.

The important rôle of cowpea is reflected in the MSP on-farm testing program for 1994 where approximately half of the trials carry cowpea. Also the Collaborative Group for Maize-Based Systems Research (COMBS) has since 1989 formally recognised cowpea as a component crop.

MSP is concerned with the processes which force farmers to fallow or even abandon their land. These are mainly: nutrient exhaustion, weed encroachment, erosion/compaction, and *Striga hermonthica* parasitism. As already mentioned, cowpea can make contributions toward alleviating each of these risks to sustainability. Measurement of these contributions is necessary to help support decisions on when and where to use cowpea and which cowpea to use. The characteristics of interest are therefore grain yield, hay yield, biological nitrogen fixation (BNF), ground cover, and the effect on *Striga hermonthica* seed germination. These are observations which we would encourage cowpea researchers to consider making. We would also be glad to discuss methodology for these observations (our expertise being in ground cover estimation, BNF, soil physical and chemical properties). For planning purposes, the importance of P in the process of BNF should be taken into account. A phosphorus treatment factor will be important on most savanna soils.

Finally, RCMD is concerned with testing and transfer of technology. To this end we are happy to provide advice on on-farm participatory methods if needed. We also want to remind technology generating researchers that, although their technology may not be appropriate everywhere, it is probably appropriate to some farmers. We are happy to interact with researchers who want to target a technology to appropriate farmers.

Integrated Pest Management (IPM) (W. Hammond)

Rather than relying on one technique for insect pest control, a better strategy is to have several, one of which can be biological control. Research in this field began seven years ago and is still in the technology development phase. Technology transfer will come, but this will be at some time in the future.

By way of a precursor to future expectations for technology testing and transfer, an IPM project was recently implemented, which involves NARS of five countries of which four are RENACO member countries (Benin, Burkina Faso, Niger and Nigeria). Lead NARS for the project are Burkina Faso, Niger and Nigeria. The fifth country is Mozambique where the SADC cowpea research project was based until the end of 1993. The project focuses on cowpea production in the lowland dry savanna. The project's main aims are to characterise the major ecological and socio-economic factors which affect cowpea production, to survey pest and disease incidence, to test available technologies, to analyse their adoptability and make further modifications as required in order to improve the probability of adoption. The first project workshop took place in July 1994 and concentrated on survey techniques. The project has a budget of $1.1m for five years.

2.2.9 Synthesis of main points arising from country/status reports

The Chairperson of the session presented a synthesis of main points contained in the country and status reports as follows:

Production constraints

The major constraints to cowpea production in the six countries that presented reports are basically the same as those identified in the 1987, pre-RENACO Workshop, the only difference is that varying levels of success have been achieved towards the resolution of some of the constraints. The major constraints are as follows:

- *Abiotic Constraints*
  - Unpredictable, erratic rainfall which is low in amount (in major production areas) and poorly distributed resulting usually in drought periods and occasionally in excess moisture (water-logging)
  - High soil temperatures
  - Low soil fertility/productivity
  - Soil erosion by run-off water and wind
  - Degraded, fragile soils

- *Biotic Constraints*
  - Insect pests
  - Parasitic flowering plants (*Striga gesnerioides* and *Alectra vogelii*)
  - Diseases induced by fungi, bacteria, viruses, and nematodes
  - Weed infestations

- *Socio-economic Constraints*
  - Farmers' attitude to cowpea production in respect of the priority given to cowpea in resource allocation, compared to resource allocation to other activities, especially cereal production
  - Resource-poor farmers are responsible for most of the cowpea production
  - Their capacity to procure inputs is limited
  - Poor input delivery systems and little or no access to inputs, especially good quality seed, fertilizers
  - Marketing and utilization problems

On-going research and development activities in different countries

All six countries reported that their cowpea research is farmer-focused, problem-solving and multidisciplinary. A number of technologies have been developed and have either been transferred to the farmers or have been released but are not yet adopted by the farmers. Other technologies are undergoing pre-release, on-farm adaptive trials while some require further evaluation. In the area of technology transfer, seed increase and distribution are not adequately addressed in most countries.

Until September 1993, the financial support by RENACO had been an effective critical catalyst in cowpea research and development in all countries. Inadequacy of funds and logistic support remain as the major bottlenecks to more rapid advances in cowpea research and development by the NARS.

Activities of IITA

IITA Kano Station was established in 1990 to conduct strategic research on cowpea from the perspective of the place of cowpea in the

farming systems of the dry (Sudan) savanna and the Sahel. Thus development of cowpea varieties adapted to traditional production systems is a major objective.

IITA Kano Station has collaborated with national programmes and RENACO in developing *Striga* and *Alectra* resistant varieties that have been widely tested in the sub-region. Some of these varieties have been recommended for release in some national programmes.

IITA Ibadan was responsible for identifying and incorporating aphid resistance genes into suitable agronomic backgrounds; moderately high level of bruchid resistance has also been identified and incorporated into vars. IITA Ibadan has correctly assumed sole responsibility for work in wide crosses (with a view to transferring high levels of insect pest resistance available in wild relatives of cultivated cowpea, especially *V.vexillata,* into the former) and other aspects of biotechnology including initial efforts in recombinant DNA technology.

From the FSR perspective, cowpea contributes to human food, animal feed, soil N; it also protects the soil from erosion and impresses weeds by providing good ground cover; in addition, some cultivars are an effective false host to *S.hermonthica* which can therefore assist in the depletion of the *Striga* seed bank due to suicidal germination.

For these several reasons, the IITA Resource and Crop Management Division includes cowpea in research activities for sustaining the productivity of cereal and root crop-based systems of the savannas.

IITA's Plant Health Management Division has initiated a project on Sustainable Control of Cowpea Pests. This is a pilot project that involves five countries, four of which (Burkina Faso, Niger, Nigeria and Benin) are RENACO members. It is a welcome initiative that will greatly boost our research and development efforts in cowpea.

Next Steps

On a practical issue, the report from Ghana of a very short duration variety was of general interest. Please could seed be made available for testing in other countries.

The Chairperson then concluded by inviting questions and discussions as a means of deciding future plans. In this respect, it would be important to think beyond the short term utilization of the available funds. Longer term identification of goals and associated planning must also be addressed.

2.3 Discussion

2.3.1 Topics

The topics discussed fill into two broad categories:

- Those concerning technical points in the country/status reports. Questions mainly sought more information and/or clarification.
- Those which addressed future strategy, in particular short and longer term priorities for RENACO.

In the following sub-sections, summaries for each of these categories are presented.

2.3.2 Technical details

Waterlogging

Question: The above average rainfall of the current (1994) season had demonstrated that waterlogging is deleterious to cowpea production. It leads to more disease and there are physiological effects on growth. This problem is observed roughly once in every three years. Should it receive more attention?

Answer: It was agreed that amelioration of the problem of waterlogging should be a plant breeding objective.

Wide crossing

Question: As follow up to IITA's report, Burkina Faso commented that in the Kamboinse area there is a *Vigna* species which produces tuberous roots. Is this *V.vexillata*? They had attempted crosses between this species and *V.unguiculata*, without success. Seeds had appeared but subsequently aborted.

Answer: It is very possible that the Kamboinse *Vigna* spp. was *V. vexillata* . If IITA could have some seeds, they would grow it out and

determine the species. An IITA accession of *V.vexillata*, TVu 72 is resistant to all cowpea insect pests. Most of the *V.vexillata* germplasm is resistant to *Maruca*, PSB and thrips. Some is susceptible to aphids. Embryo rescue techniques are definitely needed for the wide cross, *V.vexillata* x *V.unguiculata*. IITA has not succeeded (yet).

Early varieties

Question: Is the yield potential of the new early variety which Ghana reported, sufficient to make it worth considering? IITA has developed 60-day varieties but a problem with them, is their low yield.

Answer: It was frankly admitted that there is nothing exciting in the variety except its earliness. It is susceptible to bacterial blight. The seeds are black, the pods are leathery and they shatter. Usually it is planted early (in April) and it helps to ease the hunger gap of June-July. Since major genes are controlling earliness, it is both useful and useable in the breeding program.

Cowpea improvement strategy

Question: From the several reports, it was apparent that the importance of cowpea has been underestimated. The crop has several important roles in the farming system. This in turn means that several research disciplines are concerned with this crop. What therefore are the criteria that are used for cowpea improvement? Is there good integration at the national level in order to make the best use of the human resources that are available?

Answer: The early history of cowpea research in SAFGRAD was briefly reviewed. During SAFGRAD Phase I, research on agronomic practices was emphasised. Aspects covered included intercropping, relay cropping, time of planting, photoperiod and time to maturity. The findings from this work led to recognition of the need for cowpea improvement emphasising certain traits such as pest, disease and *Striga* resistance, drought and high temperature tolerance. Plant types adapted to inter-cropping particularly with maize also were needed.

In spite of a weaker period (1983-87), the region had taken up the challenge to improve cowpea such that by 1993, attainments in variety development were considerable. Of course, more remains to be done, but future work will be building on past achievements in which the network has played an important role.

At a national level, research on systems of farming (FSR), problem-oriented research planning, multi-disciplinarity and on-farm research (OFR) all have made a valuable contribution to defining the required scope of research. Along with this, the Network facilitated exchange of ideas and in some instances led to an amendment of an approach at national level. For cowpea, recognising that there is not one single goal is important. There are several goals which in turn require several approaches. An example of this broader remit is the need for dual purpose (fodder and grain) varieties as well as high grain yielding varieties. Another is the need to ensure suitability for intercropping. In both cases, NARS have responded to these needs. Even so, there are other requirements which should receive attention, e.g. efficiency of a variety as a trap crop (false host) for *Striga hermonthica*, nodulation and P efficiency, exploiting new opportunities for industrial uses which the economic situation presently favours.

In sum, NARS research approaches, combined with opportunities which RENACO provided enabled cowpea research in the region to capture the several technical elements that were appropriate to the development of this crop. Provided this same mode of operation can be continued, new issues and possibilities can be tackled in a well integrated manner.

2.3.3 Discussions relating to future strategy

Two key issues were recognised, as follows:

Research Efficiency

The risk of duplication of effort and associated need to avoid overlap were acknowledged. There are several players in respect of

cowpea research funding, RENACO, the IPM Project, Bean/Cowpea CRSP, SAFGRAD, the EEC On-farm Adaptive Research Project as well as national government contributions. Relative to all these, research efficiency must be ensured, taking account of the different coverage, countrywise, of the several projects.

At national level, cowpea struggles with being assigned second place to cereals in terms of importance. This is a problematic policy area which affects governmental commitment to cowpea research. Relative to this, important considerations are a benchmark (e.g. current capacity in national programs, statement of what technology is developed and what is available) and the links between this benchmark and future assessment of impact.

From the outset, the IMP project had been aware of the risk of overlap. The persons from national programs who had participated in the planning meeting for the project, would be responsible for implementation of what was planned. The selection of persons had been achieved through using RENACO links.

Bean/Cowpea CRSP had operated in Cameroon, Senegal and Ghana with emphasis on storage, semi-arid zone adaptation and IPM respectively. IPM in Ghana is continuing.

Rounding off on research efficiency, the point was emphasised that RENACO is a regional integration of NARS capability in cowpea. As such it is part of (and not distinct from) NARS. In its operation, it is an enabling mechanism for certain aspects of research, and individually each NARS derives from it according to what is most appropriate for that NARS.

Future research priorities

Discussion mainly revolved around how to strike a balance between a short term plan, concentrating on one year's funding, and definition of longer term research needs and related research proposals. There was general agreement that the longer term research was still needed. At the same time, country representatives realised that technologies were available and for this reason, a short term program

aimed at improving technology transfer was justified. In this latter context, the importance of achieving some impact in the short term was recognised because it could give evidence of credibility and hence attract funding for longer term plans.

An important aspect of short term planning was to specify achievable short term goals, and realisable outputs. It was pointed out that technology testing at the on-farm level has a diagnostic value which can give feedback to the upstream research planning. It also provides a starting point for determining the extent of technology adoption.

By way of conclusion, it was agreed that each country should define their short term goal and the related activities which were the most important for that particular country. Indeed, some country reports had already summarised short term goals, focusing on on-farm research. The need was to put this together on a country-by-country basis. After this, the longer term need, would be considered, in a more regional context.

Seed Production

The issue of the extent to which research should be involved in seed production was discussed. In the main, what emerged, was that researchers are either involved in seed production or see it as an acitivity for which they should accept some future responsibility. Seed production (beyond breeder seed) is commonly a weak, poorly serviced area at national level. Research is faced with a difficult situation. If seed multiplication is ignored, spread of better varieties is seriously impaired. When research engages in seed multiplication, even if it acts as a facilitator for a community-based activity, it takes research into the area of agricultural support services and reduces the time given to research. Nevertheless, all RENACO members saw seed production as an activity which they could not easily ignore. Indeed, to do so, jeopardised the delivery of outputs from several of their own research efforts because development of improved varieties was a component of all national programs.

3. SHORT TERM PLANS (1994/95 PROGRAM)

3.1 Rationale

Earlier research under RENACO had generated technologies. The impact assessment had identified weakness in technology transfer. Therefore, the short term goal would be to improve the extent of technology transfer through a range of adaptive research activities for which on-farm testing with farmers' participation would have major attention.

3.2 Proposed Activities and Justification

3.2.1 Variety testing on farmers' fields

The testing program would be conducted either as farmer managed trials or, in some cases, as researcher managed trials. In all cases the improved varieties which are tested would have characteristics which are targeted on reducing or overcoming locally known production problems e.g. *Striga* and *Alectra*, insect pests (aphids, thrips and bruchids) or system requirements e.g. suitability for inter-cropping.

3.2.2 Seed multiplication

Seed availability is a limiting factor for variety adoption. Seed multiplication would be undertaken either by planting large researcher managed plots (which also serve as variety demonstration plots) or by involving farmers as individual contract growers or in a community-based scheme.

3.2.3 Storage

The three-layer plastic bag technique for safe seed storage would be demonstrated and promoted. This technique was developed and tested under the USAID Bean/Cowpea CRSP project. Wider dissemination of this proven successful technique for reducing storage losses is now required.

3.3 Country-Specific Details

3.3.1 Burkina Faso

On-farm variety testing

In 1995, the INERA cowpea program will expand their on-farm testing of improved varieties. Out of the 12 regional development centres in Burkina Faso, six are presently covered. The aim would be to cover more centres, ideally all of them. Available varieties have different traits or combinations of traits, — thrips and aphid resistance; thrips and *Striga* resistance; *Striga* resistance only.

Large plot variety demonstration and seed multiplication

Better levels of resistance to insect pests in improved varieties result in lower requirements for insecticidal sprays. Large plots of these varieties (1000m^2) would be grown beside a similar plot of a local variety. Plots would be located where farmers could easily visit and observe them. The plots would be managed in such a way that good quality seed would be obtained which would, in turn, provide seed for distribution to farmers.

Variety promotion and dissemination

Some varieties of proven superior yield performance are available which require no further testing. The aim would be to promote these varieties and obtain feedback on their consumer acceptability (i.e. organoleptic suitability).

Vegetable cowpea

Two varieties will shortly be identified as vegetable varieties. These would also be ready for demonstration to farmers.

3.3.2 Benin

The overall focus is on-farm productivity of cowpea.

On-farm testing

The INRAB cowpea program would undertake on-farm testing of improved varieties, including a 'with insecticide spray' treatment. This

program inter-relates with activities of the extension services and links up with contact farmers.

Seed production, on-farm

On-farm plots would serve to multiply seed and demonstrate improved varieties.

Storage

In the south of Benin, improved production of cowpea has led to localised gluts. Hence better grain handling and storage methods need to be disseminated. Using outputs from the CRSP project, solar drying and triple plastic bag storage would be locally tested and promoted, with a farmer training component.

3.3.3 Cameroon

On-farm variety testing

In regional trials (1992-1994), improved varieties have been evaluated under intercropping. Certain varieties are now ready for pre-extension, on-farm testing. The aim would be to determine how they perform under inter-cropping on farmers' fields.

Seed production

Engaging in seed production would serve two purposes,— increasing the seed stocks of improved varieties (seed shortage currently hinders dissemination) and providing an example to farmers of the possibility for them to engage in seed production.

Grain drying and storage

Solar drying and triple plastic bag sotrage has worked well and farmers have accepted it. This was reported by way of encouragement to those RENACO members who intended to include it in their programs.

3.3.4 Ghana

On-farm variety evaluation

Three newly developed cowpea varieties will be evaluated on-farm. Varietal characteristics are heat tolerance and aphid resistance, aphid and thrips tolerance (2 vars). These varieties were evaluated in 1994 at 13 sites. This evaluation now needs to be repeated. It will be carried out in close collaboration with the socio-economists. Extension workers and farmers will also be involved.

Community-based seed production

Research scientists cannot ignore seed production. It is a service that is needed and if it is not provided spread of improved varieties will be limited. Researchers are urged to be involved in seed production. The basic requirements for operating community-based schemes are in place. Seed production through these schemes would therefore be an activity in 1995.

3.3.5 Niger

The country report had specified ten research activities of which five concerned on-farm adaptive research with the aim of determining the potential for transfer of developed technologies. These five adaptive research activities had a short time frame. They were:

On-farm testing of improved varieties

Main aspects of on-farm evaluation would be yield performance, adaptation and suitability to the farmers' production system, and *Striga* resistance.

Grain storage

Building on findings of the storage survey, various improved storage methods would be tested with farmers. In addition to the solar-plastic bag storage method, efficacy of neem (leaves and oil extract) would also be tested.

Use of insecticides

The economics of using insecticides for monocropped cowpea production would be studied, as an on-farm program. The evaluation would therefore take account of farmers local circumstances and assess the potential for adoption of chemical-based crop protection practices.

Cultural techniques

Cultural techniques, such as recommended plant densities, use of manures would be evaluated under farmers' conditions.

Consumer acceptability of new varieties

Organoleptic suitability of new varieties would be determined by conducting evaluations at the rural community level on cooking properties and consumer acceptance.

3.3.6 Nigeria

Variety testing, on-farm

The focus would be on variety testing combined with use of seed treatments. Main attention would be on evaluation of varieties with resistance to *Striga* and *Alectra* in an improved background of insect resistance (aphids, bruchids and to a lesser extent thrips). The effect of the improved varieties on the seed bank of *Striga gesnerioides* would be monitored. This on-farm program would be complementary to an on-station program where new seed treatments were evaluated in various combinations with improved varieties.

3.4 Cross Country Comparisons and Synthesis

It was on the basis of the individual country presentations that RENACO members decided upon the three main activities summarised in Section 3.2.

The deciding factor was the frequency across countries for particular adaptative research activities. The items that each country specified are summarised in **Table 1**. From this table, it is evident that the the three

main activities in order of common need/importance were:

- On-farm variety testing with emphasis varying according to local circumstances (6 countries)
- Seed production and variety demonstration in large plots (2 countries)
- Promotion of storage methods (2 countries).

A query was raised concerning the regionality of the proposed program. Since it was based on assembling national level priorities what was the regional justification and regional focus in the context of RENACO.

The suggestion that the proposed program was inappropriate for RENACO was rejected. RENACO members agreed that their mode of interacting and the related decision-making on program priorities were not fixed as one set procedure. Looking back, RENACO had progressed through various stages of professional development and manner of working and this would continue to apply. When considering the agreed short-term program (Section 3.2 and Table 1), two main themes were evident which were of considerable regional value and therefore of great value to accomplishing the network's aims. These were:

- Firstly, the overall focus of the short-term program is on-farm research, particularly testing of improved varieties. This common theme across all countries could enable RENACO members to meet together subsequently and discuss their experiences in this aspect of the technology development and transfer process. It is was anticipated that a great deal could be gained from having this common theme. That specific country agendas were geared to local conditions was logical and did not detract from the common focus and mode of working.
- Secondly, there were common technical themes running across the country specific agendas, e.g. evaluation of *Striga* resistance and insect resistance; the adoptability of the solar drying and plastic bag storage technique (— would adoption be as successful as Cameroon had reported?); farmer reaction to variety demonstration and

availability of seed. Discussion of findings would clearly be of considerable mutual interest to RENACO members.

In sum, it was the similarity of research approach and technical content that gave a regional focus to individual national program plans. RENACO would enable its members to derive substantial mutual benefit from individual (national) endeavours.

4. LONGER TERM RESEARCH PLANS

4.1 Introduction

The procedure followed for developing the longer term program was similar to that used for short-term planning. Each country summarised their longer term research plans adding a brief rationale for the plan. These plans were summarised and synthesised. It was agreed that longer term plans comprised two main research fields:

- *Integrated pest management*
  This emphasised further improvements in insect pest and parasitic weed control through host plant resistance breeding combined with improved adaptation to abiotic stresses (heat, drought, dry season conditions of low temperature and low humidity).

- *Cropping systems research*
  With cowpea (for grain and/or fodder) as a component crop, the aims are to improve productivity and sustainability of the system.

All six countries presented longer term research plans for integrated pest management, and in three countries (Burkina Faso, Ghana and Niger) these were combined with work on abiotic stresses.

In addition, three countries (Ghana, Niger and Nigeria) described their plans for cropping systems research, and pointed out how closely these were related to research on the improvement of resource management.

Individual country plans are outlined in Section 4.2 and the agreed RENACO strategy for addressing these plans in described in Section 4.3.

4.2 Country-Specific Details

4.2.1 Burkina Faso

Host plant resistance breeding

The aims are:

- To improve bruchid resistance by pyramiding available genes. Three to four generations can be advanced each year.
- To introgress *Striga* resistance into dual purpose cowpea using back-crossing methods and similarly for the vegetable cowpea also.

Abiotic Stresses

Using screening techniques which have been developed, to improve levels of drought tolerance.

4.2.2 Benin

Integrated Pest Management

As part of the continuing efforts in pest management, the breeding program would concentrate on increasing the levels of resistance to major insect pests through host plant resistance breeding. Sources of resistance available through RENACO and from GLIP (IITA) are currently being introduced into local varieties.

Through links with IITA in Kano, breeding for improved resistance to *Striga* would continue.

As a joint program with the national crop protection service, insecticide trials would be undertaken.

As a continuing strategy, new sources of resistance identified in materials in regional trials would be utilised in the national breeding program.

4.2.3 Cameroon

Variety evaluation and selection

Through links with IITA in Kano, screening and selection of advanced lines will continue. Screening is under intercrop conditions with sorghum which complements the Kano-based evaluations of cowpea with millet.

Thirty varieties would be screened in multi-locational trials. Seed production for pre-extension trials would also be undertaken.

4.2.4 Ghana

The program will have three components, as follows:

Development of stable high yielding varieties

The aim will be to improve host plant resistance to insects (aphids, thrips and pod sucking bugs), *Striga* and diseases (especially bacterial blight), together with improvement of tolerance to abiotic stresses (heat and drought).

Development of early varieties

As described earlier (Section 2.2.4) there is a niche for early varieties. These will be developed utilising local germplasm as a source of genes for short duration.

Cropping systems research

Long term trials on cropping systems comparing monocropping, crop rotations and intercropping systems will continue. They have been carried out over several years and have produced very interesting results concerning crop and resource management. The aim now is to widen their scope so that more information is gathered e.g. *Striga* seedbank reduction.

4.2.5 Niger

At national level, the problem of soil degradation is a priority. INRAN has five major research programs, one of which is rainfed crop production. Within this program, there is a project for sustainable management of rainfed cropping which has soil improvement as one of its aims. This aim links up, of course, with the national priority of combatting soil degradation. The importance of cowpea in the project is recognised although other crops are included as well. These details provide the background context for the four longer term areas of research on cowpea, as follows:

Development of cowpea varieties for grain and fodder production, as an intercrop with cereals

Currently available varieties are not well adapted to intercropping. Improved grain and fodder varieties for these conditions are needed because the dominant system for cowpea production is intercropping and this will certainly continue in the medium or even long term.

Integrated pest management

To develop appropriate methods for integrated control of *Striga* and insect pests (aphids, thrips etc.), emphasising methods which are less expensive than those currently available. *Striga* and aphids have priority.

Cowpea utilization in baby foods

The focus is child malnutrition but research plans are less well defined for this area. The aim is to identify and/or develop varieties which could be used for preparation of weaning foods for babies. Requirements are to reduce levels of anti-nutritional factors (particularly those related to flatulence).

Cowpea production in the dry season

To develop varieties adpated to the harsh climatic conditions of the dry season, particularly the lower temperatures. Aphid resistance also is required since aphids are the main pest in this season.

4.2.6 Nigeria

Integrated pest management

To develop appropriate methods for integrated control of *Striga* and insect pests (aphids, thrips, bruchids), including investigation of seed treatments for pest and disease control, particularly bacterial blight.

Cropping systems and soil fertility maintenance

To improve maintenance of soil fertility in cereal-based intercropping systems.

4.2.7 Discussion

Before moving to strategic decisions there was another discussion session which covered some further items (technical and institutional) for consideration and/or inclusion in future plans. These were:

- ***Resource management.*** Although cowpea is a secondary crop in cereal-based cropping systems, its pivotal role in resource management is clearly evident. RENACO can with justification argue that this crop provides a well focused starting point for resource management research because it is an integral component of the present savanna cropping systems. The agenda for research on integrated pest management (ecologically sustainable plant protection) compliments the emphasis on cowpea for improving resource management.
- ***Training.*** Any future strategy should include training.
- ***Needs of small NARS.*** Small NARS mainly handle agronomic research and they need finished varieties.
- ***Need to widen the germplasm base.*** There was a need for exchange of early generation breeding lines or populations (F_3-F_6) between breeding programs to permit selection for specific environments. This should lead to the release and production of many more varieties and reduce the chance of a new pest or pathogen causing widespread damage.
- ***Aphid resistance.*** The source of resistance is known (i.e. the germplasm accession), but the basis of the resistance is not known. It is currently being studied.
- ***Abiotic stresses.*** Screening techniques need to be well worked out. Different sowing dates and locations are useful screening tools. Progress with development of drought tolerance was in SAFGRAD's remit but progress was relatively poor. Large numbers of varieties cannot be handled, especially when several locations are involved. Screening techniques that make it possible to use only one location are valuable. In spite of lack of progress to date, field observations definitely indicate that there is a need to improve drought tolerance. Efforts in this area should be continued.

4.3 Longer Term RENACO Strategy

As with short-term planning, country-specific plans were collated. From this exercise (refer **Table 2**) the main research areas were identified. These were, in effect, a representation of the regional research agenda for cowpea. Across country similarities demonstrated how future interaction (facilitated through RENACO) could strengthen the research delivery of individual countries.

The regional importance of research on integrated pest management (IPM) was evident. What also became evident (which had not been the case at the beginning of the planning session) was that a focus on resource management research was in place in two ways, – the cropping systems research (three countries) and the plant breeding emphasis on adaptation (particularly intercropping, four countries).

RENACO members agreed that natural resource management to ensure sustainable crop production is an important research area and they prioritised it, together with IPM, for the cowpea regional research agenda.

5. BUDGET AND ACTION PLAN

5.1 Budget Considerations

The available budget in RENACO for NARS field research ($50,000) clearly could not cover the total agenda as given in Sections 3 and 4. Therefore, it was agreed that this budget should be utilized for the longer term research agenda. In addition, taking account of the donor funding (Swiss) that would be available through the cowpea IPM project (refer Section 2.2.8) for four RENACO member countries (Benin, Burkina Faso, Niger and Nigeria), it was justifiable to prioritise use of RENACO funds for the cropping systems component of the research agenda.

In the context of these decisions, possible sources of funding for the short-term adaptive research agenda were then discussed. It was agreed that the adaptive research concerning storage (refer Section 3.2.3) could be funded under the cowpea IPM project since the two RENACO countries concerned (Benin, Niger) were included in this project. For the remaining two activities (on-farm variety testing and variety demonstration/seed production), IITA was requested to make a submission on behalf of RENACO to the Steering Committee of the EEC funded On-farm Adaptative Research Project[4].

The decisions described above are summarised in **Table 3, part A.**

5.2 Action Plan

The following actions were agreed:

1. Individual countries will submit project proposals for short-term and longer term research for the agreed priority areas. The deadline for receipt of these submissions to the Chairperson of the RENACO. Steering Committee is 30 November 1994.
2. The proposals should be sent to IITA, Ibadan marked: Attention RENACO, c/o Director, CID. The Director will liaise with the RENACO Chairperson and arrange for safe delivery.
3. The proposals will be reviewed and a proposal for allocation of funds will be drawn up.

---

[4] IITA took action as requested with a successful outcome (refer covering letter accompanying circulation of those proceedings)

4. The proposals and associated recommendations for allocation of funds will be reviewed at a mini-RENACO Steering Committee Meeting to be held at IITA, Kano Station in March 1995 (between 5-25 March 1995, final date to be decided). Member country attendance at this RENACO meeting would be restricted in order to conserve funds. Provisional country attendance would be Nigeria (Chair), Niger (because of proximity) and Benin (because the country representative could link up with IITA transport). ICRISAT and ILRI representatives may attend.
5. In view of the need to identify funds for long term research after the 1995 season (refer Section 4.3), the mini-RENACO meeting will be used to finalise actions on submissions of projects to possible donors.
6. As follow up to the report of Ghana NARS based at SARI, regarding their long term research on cropping systems, the IITA research scientist of RCMD would hold further discussions on this work during his imminent intended visit[5].
7. Mali and Senegal would receive copies of the proceedings of the planning meeting and would be invited to submit project proposals. It was sincerely hoped that they would participate even though they had not been able to attend.

These agreed Actions 1-7, as described above, are summarised in **Table 3, part B.**

[5] These discussions took place. The outcome is summarised in Annex C.

TABLES

Table 1: Adaptive Research Activities — main areas of emphasis as specified by RENACO member countries for their individual 1995 season programs:

Country	On-farm Variety Testing						Seed Production		Storage		Others		
	Resistance to :		Improved Vars. :										
	Striga/ Alectra	Insect pests	With insect spray	With seed trt.	For inter-crop	Heat tol.	Comm-based	Large demn. plots	Solar + bagging	Others mthds.	Var. suita-bility (organo)	Veg. Var. demn.	Cultivar Practices
Burkina Faso	X	X						X			X	X	
Benin			X					X	X				
Cameoon					X			X					
Ghana		X				X	X						
Niger	X				X				X	X	X		X
Nigeria	X	X		X									
Mali	Not represented												
Senegal	Not represented												
Total countries	6						4		2		2		

Table 2: Longer Term Research Plans — main problems to be addressed as specified by RENACO members for national cowpea research programs

Country	Integrated Pest Management						Abiotic Stresses			Adaptation			Systems	
	Striga	Aphids	Thrips	Bruchids	PSB	Bact. blight	Drought	Heat	Low temp.	Inter-crop	Short duration	Dual purpose	Yield sustain., soil fert.	Post Harvest Utilisation
Burkina Faso	X			X			X							
Benin	X	X	X	X										
Cameroon										X				
Ghana	X	X	X		X	X	X	X		X	X		X	
Niger	X	X	X	X					X	X		X	X	X
Nigeria	X	X	X	X		X				X			X	
Mali	Not represented													
Senegal	Not represented													
Total countries	5						3			4			3	

Table 3: RENACO Planning Meeting, 12 - 13 September 1994 —Summaries:

A. Agreed Short and Long Term Research Agenda

B. Action Plan

Activity/Topic	Time/Season	Source of Funds (A) Responsible party (B)
A. ***Short and Long Term Research Agenda***		
Short/Adaptive		
1. On-farm Variety Testing	1995	EC-OFAR
2. Var. Demonstration and seed multiplication.	1995	EC-OFAR or other (eg. SAFGRAD)
3. Storage methods	1995	IPM Project (Swiss)
Long/Applied		
1. Integrated Pest Management	1995 onwards	IPM Project (Swiss)
2a. Cropping Systems leading into, -	1995	USAID
2b. Resource Management	1996 onwards	To be identified
B. ***Action Plan***		
1. Submission of research proposals	By 30 November 1994	RENACO member countries
2. RCMD (IITA) visit to SARI, Ghana	September 1994	IITA and SARI Staff
3. Meet with OFAR Steer. Comm.	October 1994	Director CID, IITA
4. Review of proposals and funding	By February 1995	Chair RENACO St. Comm. with IITA
5. Development of proposal for Resource Management Project	December 1994 to January 1995	RENACO members and IITA
6. Mini-RENACO Steer. Comm. Meeting	March 1995	RENACO Chair and IITA
7. Research implementation	Wet season 1995	RENACO members

ANNEXES

Annex A

LIST OF PARTICIPANTS

NARS REPRESENTATIVES

Burkina Faso

1.	Clémentine DABIRE	Entomologist and Head of Cowpea Program INERA, Kamboinsé Station BP 476, Ouagadougou
2.	Issa DRABO	Cowpea breeder INERA Kamboinsé Station BP 476, Ouagadougou

Benin

3.	Abou OGBON SANNI	Head of Crop Protection Division INRAB, Niaouli Station BP 03, Attogon

Cameroon

4.	Chevalier ENDONDO	Grain Legume Agronomist and Coordinator of the National Cowpea Program, IRA BP 33, Maroua

Ghana

5.	K. O. MARFO	Cowpea breeder SARI, P. O. Box 52, Tamale

Mali (Not represented)

Niger

6.	Moutari ADAMOU	Cowpea breeder INRAN, BP 489, Niamey

Nigeria

7.	O. O. OLUFAJO	Agronomist and Leader Legumes & Oilseeds Research Program IAR (ABU), PMB 1044 Zaria.

Senegal (Not represented)

IITA STAFF
IITA Headquarters
PMB 5320, Oyo road, Ibadan, Nigeria:

8.	Robert CARSKY	System Agronomist Moist Savanna Program Resource and Crop Management Division
9.	Kenton E. DASHIELL	Leader, Grain Legume Improvement Program, Crop Improvement Division
10.	Louis E. N. JACKAI	Entomologist, Host Plant Resistance Program, Plant Health Management Division
11.	F. Margaret Quin	Director, Crop Improvement Division

IITA Benin Station
BP 08-0932, Cotonou, Republic of Benin

12.	Winifred N. O. HAMMOND	Entomologist, Technology Transfer andTraining Unit, Plant Health Management Division
13.	Raymond ALLOMASSO	PHMD
14.	Manuele TAMO	Ecologist and Leader, Habitat Management Program Plant and Health Management Division

OAU/STRC

15.	Taye BEZUNEH	Director of Research, OAU/STRC-SAFGRAD BP 1780, Ouagadougou, Burkina Faso
16.	Nyanguila MULEBA	SAFGRAD Consultant BP 1780, Ouagadougou, Burkina Faso

CONSULTANT

17.	A. M. EMECHEBE	Deputy Director (Research) IAR (ABU), PMB 1044, Zaria, Nigeria.

USAID (Part of 12 September only)

18.	Carole LEVIN	G/RD/AGR/IARC SA-18-513 Washington DC 20523-1809
19.	Y. C. PRUDENCIO	REDSO/WCA BP 1712, Abidjan Côte d'Ivoire

Annex B

PROGRAM OF THE PLANNING MEETING
12-13 September, 1994

RENACO PLANNING MEETING
12-13 SEPTEMBER 1994
RELAX HOTEL, OUAGADOUGOU, BURKINA FASO

12 September 1994

08.30 - 09.00: Registration
09.00 - 10.00 Session 1 Chairperson: K. Dashiell

- Opening Remarks by the Chairperson
- Welcome Address on behalf of INERA - Madame Dabire
- Welcome Address on behalf of OAU/SAFGRAD - Dr Taye Bezuneh
- RENACO Overview
  - NARS comments: Professor Emechebe
  - IITA comments: Dr F. M. Quin

GROUP PHOTOGRAPH AND COFFEE BREAK

10.45 - 12-30: Session 2 Country Reports & other Status Reports

Chairperson: Professor Emechebe
Rapporteurs: K. Dashiell and F. M. Quin

- RENACO Report by Chairperson of Steering Committee, O. O. Olufajo
- Country Reports
  - Burkina Faso
  - Benin
  - Cameroon
  - Ghana
  - Mali (absent)
  - Niger
  - Nigeria
  - Senegal (absent)
- IITA
  - Cowpea Improvement (K. Dashiell)
  - Insect Resistance (L. Jackai)
  - Resource and Crop Management (R. Carsky)
  - Integrated Pest Management (core research and regional project, W. Hammond)

12.30 - 14.30 LUNCH BREAK

14.30 onwards: Completion of Session 2

- Continuation of individual reports as required
- Report by the Chairperson - Synthesis of Main Points

Session 3 Chairperson: F. M. Quin

- Discussion and Synthesis of Strategy for 1995
- Formulation of program planning session on 13 September 1994
  In broad outline this will cover:
  - Work Plan 1995
  - Administrative Matters
  - Finances

13 September 1994

Program proceeded as planned in Session 3 on 12 September and included a field trip to a cowpea farmer, organised by INERA

Annex C

IITA visit to SARI, GHANA

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE
RESOURCE & CROP MANAGEMENT DIVISION

INTER-OFFICE MEMORANDUM

To: Drs. Quin, Dashiell **Date:** 06-10-94

From: R. J. Carsky **Copy:** Drs. Baker, Akobundu and K.O. Marfo

Subject: Follow up to RENACO meeting

Dr. K.O. Marfo arranged a short meeting with Savannah Agric Research Institute (SARI) Agronomists: Frey, Kombiok, and Alhassan about RENACO funding for systems research involving cowpea.

I explained to the group that the IITA and country representatives that met in Ouagadougou in September recognized that Nyankpala scientists had done quite a bit with grain legumes in rotation and as intercrops and that this experience should be taken into consideration when preparing future work with cowpea as a contributor to sustainable farming systems.

There was agreement that an inventory of Nyankpala studies with grain legumes should first be done and that review of results from these trials could bring out recommendations, further questions, or generate testable hypotheses about the role of cowpea in resource management.

A preliminary list of trials includes:

1)	From 1981 to 1986 at Nyankpala	Maize, groundnut, sorghum, yam, and maize/groundnut in rotation with each other.
2)	From 1985 to 1994 at Nyankpala	Groundnut, sorghum, cowpea, soybean, and cassava intercropped with maize and rotated with maize
3)	From 1984 to 1987 at Nyankpala	Sole maize and maize cowpea rotation with N and P fertilizer treatments (Horst an Hardter, 1994)
4)	From 1985 to 1987 at Manga	Maize, sorghum, millet, groundnut, and cowpea in rotation with each other
5)	1983 to 1984 Nyankpala	Maize, Groundnut, cowpea, pigeonpea followed by maize.

The SARI team was reminded of the contributions of cowpea which should be quantified: soil N supply, ground cover for weed suppression and erosion control, livestock feed, and Striga hermonthica seedbank reduction.

The Nyankpala team plans to send something responding to these guidelines by 30 November.

The team wanted to know if other grain legumes could be included in the work. My feeling is that cowpea could be the sole study topic in cases where different cowpea lines are being screened for ground cover, hay biomass, striga seedbank reduction, response to fertilization, nodulation, biological N fixation, etc. However systems development should include other grain legumes for comparison.

Another question was raised about whether the work should be conducted on-farm. The trials should be **accessible** enough to conduct the intensive observations mentioned above. This may necessitate on-station work. Fortunately SARI has many different stations in northern Ghana at which they can conduct trials. Easily accessible farmers' fields will be appropriate too. Researcher-managed trials may be necessary if the system being tested is new to farmers. Otherwise, trials can be conducted by farmers. However, it is no advantage to have farmers conduct trials with several replicates and several treatments.

Annex D

COUNTRY REPORTS

- Benin
- Cameroon
- Niger

République du Bénin

Ministère du Développement Rural

Institut National des Recherches Agricoles du Bénin

Station de Recherche sur les Cultures Vivrières - NIAOULI

RECHERCHE SUR LE NIEBE EN REPUBLIQUE DU BENIN :

PROGRAMME NATIONAL ET POINT DES ACTIVITES MENEES AVEC LE GLIP / IITA - IBADAN ET LE RESEAU NIEBE DE L'AFRIQUE CENTRALE ET OCCIDENTALE (R E N A C O).

COMMUNICATION PRESENTEE LORS DE LA REUNION SUR LE NIEBE TENUE A OUAGADOUGOU LES 12 ET 13 SEPTEMBRE 1 9 9 4.

PAR

ABOU OGBON SANNI

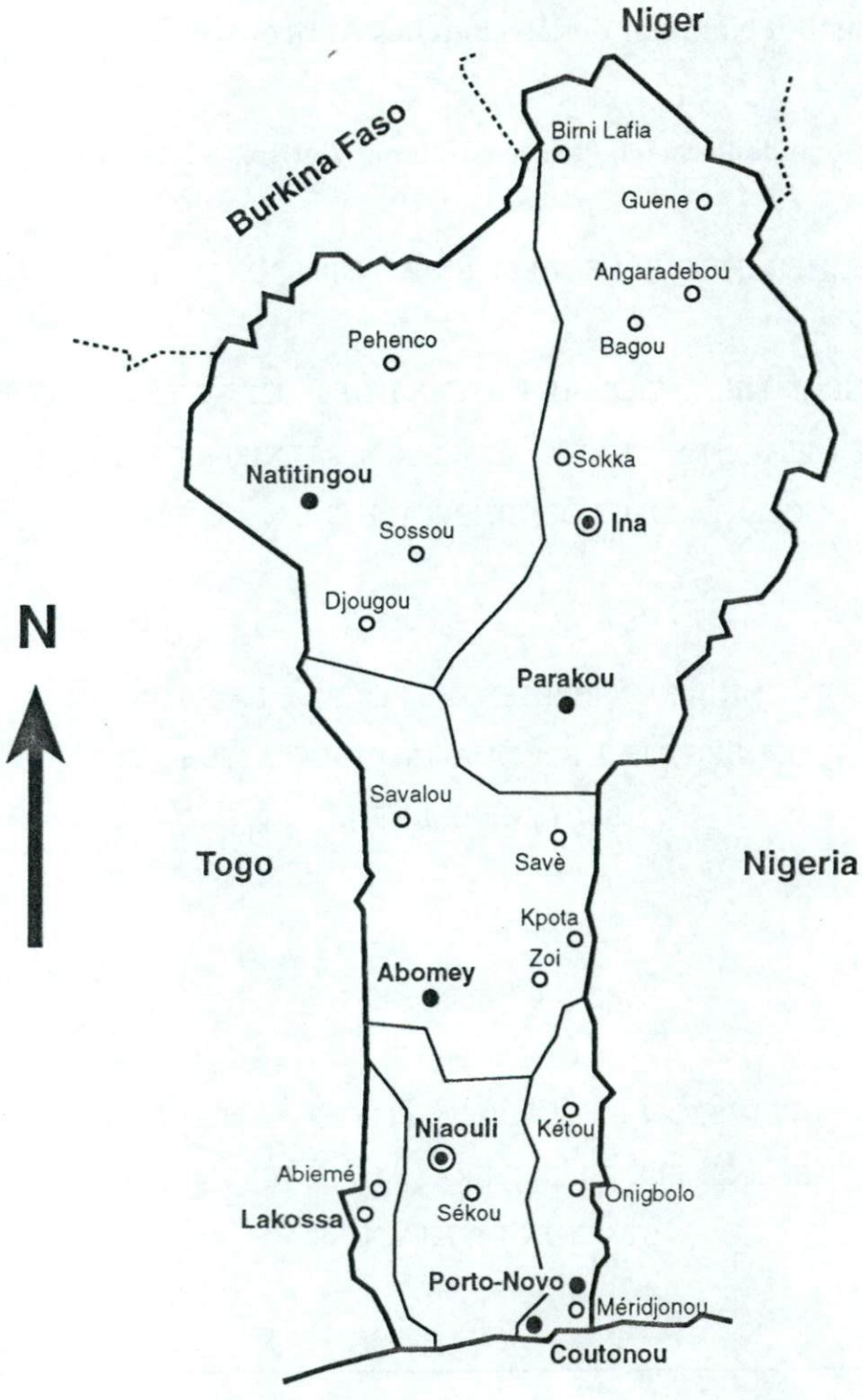
CHERCHEUR

C/DIVISION PROTECTION PHYTOSANITAIRE

RESPONSABLE P.I. PROGRAMME LEGUMINEUSE

STATION DE NIAOULI.

B.P. 3 - Tel. : 37.1150 - 37.12.50 NIAOULI (ATTOGON)



Carte du Benin: Limites administratives et points de recherche des stations Ina et Niaduli

PROGRAMME DE RECERCHE SUR LE NIEBE EN REPUBLIQUE DU BENIN : CADRE NATIONAL, DE COOPERATION AVEC GLIP IITA-IBADAN ET RENACO

I - LA REPUBLIQUE DU BENIN : GENERALITIES

Avec une superficie de 112 622 km^2, la République du Bénin est limitée au Nord par la Répulique du Niger, au Nord-Ouest par la République du Burkina-Faso, à l'Est par le Nigéria, à l'Ouest par le Togo et au Sud par l'Océan Atlantique d'une longueur littorale de 150 km.

La République du Bénin est divisée en six (6) départements :

- Au Nord :
Le Borgou au Nord-Est et l'Atacora au Nord-Ouest.

- Au Centre
Le Département du Zou.

- Au Sud
Au Sud-Ouest, le département du Mono et au Sud-Est, celui de l'Ouémé, ces deux (2) derniers encadrant le département de l'Atlantique (figure jointe).

1.1 - CLIMAT

De par sa configuration allongée du Sud au Nord, le Bénin est soumis à des climats différents. On distingue schématiquement trois (3) zones climatiques.

* AU SUD : (DEPARTEMENTS DE L'OUEME, DE L'ATLANTIQUE ET DU MONO)

Un climat de type semi-équatorial, avec une forte humidité et une température élevée et constante. L'année y est partagée en quatre (4) saisons :

- Deux (2) saisons des pluies, l'une principale de mars à début juillet avec un maximum en juin, l'autre moins importante de fin septembre à mi-novembre.

- Deux (2) saisons sèches, la grande de novembre à mars, la petite de juillet à septembre.

La hauteur moyenne annuelle des pluies, pour les régions du Sud est de 1000 à 1200 mm.

* AU CENTRE (DEPARTEMENT DU ZOU)

Le climat, bien que caractérisé par l'existence de deux (2) saisons des pluies et de deux (2) saisons sèches, se rapproche davantage du type tropical classique. La hauteur moyenne des pluies dans cette zone est de 1000 à 1100 mm.

* AU NORD (DEPARTEMENTS DU BORGOU ET DE L'ATACORA)

Le climat de type soudanien est caractérisé par l'existence de deux saisons, l'une pluvieuse monomodale de mai à septembre et l'autre sèche, d'octobre à avril. On enregistre de fin novembre à fin février, l'apparition d'un vent sec et froid, l'"HARMATTAN" qui souffle du Nord-Est et dont l'influence se fait sentir de façon décroissante jusqu'à la côte Atlantique.

La hauteur moyenne des pluies est de 800 à 1400 mm. Quant à la température mensuelle, elle varie sur l'ensemble du pays mais les écarts journaliers, faibles dans le Sud sont importants dans le Nord où l'insolation est intense et de longue durée.

L'humidité relative diminue progressivement en allant de la côte, où l'atmosphère est pratiquement saturée, vers l'intérieur du pays.

1-2 - SOLS

A partir de la moitié du Centre du pays jusqu'au Nord, on rencontre les sols ferrugineux tropicaux. Au Sud jusqu'à la moitié du Centre, on rencontre les terres de barre et les terres ferralitiques.

En raison de l'inexploitation des ressources minérales du pays, l'économie du Bénin repose pour l'essentiel sur l'agriculture pratiquée par plus de 80% la population estimée à près de 5. 500. 000 habitants.

Les principales cultures vivrières produites sont :

- Céréales : maïs, sorgho, mil, riz et fonio
- Plantes à racines et tubercules : manioc, igname, patate douce et autres aracées
- Légumineuses : arachide, niébe, soja, pois d'Angole (Cajanus cajan) etc.

Les stations de recherche sur les cultures vivrières de Niaouli et d'INA, respectivement basées au Sud et au Nord du pays sont mandatées pour la promotion de la recherche sur lesdites cultures vivrières.

Quant aux plantes pérennes et annuelles, on peut citer :
le palmier a huile, le cocotier, le caféier, le cacaoyer, le tabac et surtout le coton, principale source actuelle de revenu pour le pays.

II - PROGRAMME DE RECHERCHE SUR LE NIEBE

Le niébé est la légumineuse à graines la plus importante en République du Bénin. A ce titre, il occupe une place de choix dans l'alimentation de nos populations.

L'utilisation par les paysans de variétés locales peu productives et surtout le fort parasitisme du niébé par les insectes, les maladies et le Striga dans certaines régions, sont les principales contraintes à sa productivité.

L'essentiel du programme de recherche est orienté vers des actions, opérations et thèmes de recherche qui permettront de lever ces contraintes.

2.1 - PROGRAMME NATIONAL DE RECHERCHE SUR LE NIEBE

2.1.1 - Sélection:

(a) Prospection des variétés locales disponibles chez les paysans et leur évaluation.

(b) Introduction de variétés et lignées élites à travers des essais internationaux et régionaux afin d'en dégager celles qui peuvent servir à l'amélioration du matériel local ou à leur utilisation directe par le paysan.

(c) Création variétale par croisement de variétés élites introduites plus ou moins résistantes aux ravageurs majeurs avec les variétés sélectionnées vulgarisées ou en pré-vulgarisation.

(d) Essais variétaux en station.

(e) Expérimentation multilocale afin de tester l'adaptabilité de diverses variétés et lignées aux différentes zones agro-écologiques du pays.

(f) Essais de démonstration et tests en milieu paysan.

(g) Production de semences.

2.1.2 - Protection phytosanitaire:

- Criblage de lignées pour la résistance aux maladies majeures du niébé
- Criblage de lignées pour la résistance aux insectes majeurs du niébé.
- Criblage pour la résistance au Striga.
- Essais de traitement minimum du niébé.
- Essais comparatifs d'efficacité de molécules insecticides pour la protection du niébé en végétation.
- Conservation des stocks.

2.1.3 - Agronomie et agro-système

- Essais de densités de semis
- Essais de fertilisation du niébé
- Essais d'association du niébé avec les céréales
- Culture en couloirs incluant le niébé.

2.2 - PROGRAMME DE RECHERCHE DE RECHERCHE SUR LE NIEBE EN COLLABORATION AVEC LE GLIP IITA - IBADAN.

Les activités menées avec GLIP IITA-IBADAN comprennent les essais suivants :

- Evaluation des variétés à cycle moyen, précoce et extra-précoce
- Evaluation des variétés pour la résistance aux pucerons
- Evaluation des variétés pour la résistance aux thrips
- Evaluation des variétés pour la résistance aux bruches
- Evaluation des variétés pour la résistance aux virus
- Essais de criblage pour la résistance au Striga.

2.3 - PROGRAMME DE RECHERCHE SUR LE NIEBE EN COLLABORATION AVEC LE RENACO

Les actions menées dans le cadre du Réseau Niébé ont débuté en 1989 et concernent les essais ci-après:

- Essais régionaux d'adaptation pour la zone Nord-guinéenne.
- Essais d'adaptation pour la zone Soudano-Sahélienne
- Essais d'adaptation pour la zone de transition
- Essais régionaux de résistance au Striga.

2.4 - ACQUIS DE RECHERCHE SUR LE NIEBE EN REPUBLIQUE DU BENIN

Les différentes actions menées aussi bien sur le plan national que dans le cadre de la coopération internationale et du Réseau Niébé ont permis d'obtenir un certain nombre d'acquis qui se résument comme suit :

2.4.1 - Acquis de la recherche sur l'amélioration variétale du niébé

* A partir des prospections, certaines variétés locales intéressantes ont été dégagées des évaluations effectuées puis épurées.
Il s'agit de :

VARIETES	ZONES DE PRODUCTION
- Kpodji-Guegue	Centre, Sud et Nord
- Sewe	Sud
- Atchewekoun	Sud et Nord
- Gbotokoun	Sud
- Vounongni	Sud
- Tahoua	Nord
- Vignegne Fokpa	Centre

* Des divers essais varietaux nationaux, internationaux et régionaux, les variétés introduites ont pu être retenues :

VARIETES	ZONES DE PRODUCTION
- 1006	Sud
- IT 82 E 32	Sud et Centre
- IT 81 D - 1137	Sud et Centre
- IT 83 D - 326 - 2	Sud
- IT 84 S - 2246 - 4	Sud
- KVX 313 - 2	Sud
- IT 84 D - 513	Sud
- VITA 5	Nord
- TVX 1850 - 01 F	Nord
- TN 61	Nord
- TVX 3236	Nord

Toutes ces varietes ont fait l'objet de tests de demonstration et de tests en milieu paysan. Il s'est revelele au cours de ces tests que le choix des paysans depend surtout de l'utilisation qui'ils en font (Transformation facile en sous-produits locaux directement consommables avec goût desire, rites reliegiux ou coutumiers, etc).

* En matiere de selection creatrice, les croisements ont permis d'aboutir a des lignees stabilisees et productives suivantes :

NI 86 - 650 - 3 : Actuellement vulgarisee, rendement potentiel de deux (2) tonnes a l'hectare.

NI 86 - 503 - 2

NI 86 - 602 - 3

NI 86 - 3088

NI 84 - 1321

* En protection phytosanitaire, les acquis a mentionner comprennent :

- VARIETES AYANT BONNE RESISTANCE AUX APHIDS
  - IT 84 S - 2246 - 4
  - 83 S - 742 - 11
  - 2231 - 15
  - K N 1
  - 742 - 2

- VARIETES AYANT UNE BONNE RESISTANCE AUX THRIPS
  - TVX 3236
  - KVX 313 - 2

- VARIETES AYANT UNE BONNE RESISTANCE AUX BRUCHES

  - IT 81 D - 1137
  - IT 81 D - 994
  - IT 84 D - 460
  - IT 84 D - 449

- VARIETES AYANT UNE BONNE RESISTANCE AU STRIGA

  - KVX 402 - 5 - 2
  - KVX 295 - 2 - 124 - 52
  - KVX 100 - 21 - 7
  - IT 82 D - 849
  - SUVITA 2
  - NI 86 - 650 - 3
  - B - 301

Trois (3) traitements insecticides sont recommandes et obligatoires pour la protection du Niebe en vegetation.

Le premier a lieu des l'initiation florale. Les deux autres s'effectueront 10 a 15 jours d'intervalle respectivement entre le 1er et 2éme, puis le 2éme et le 3éme.

Le produit actuellement vulgarisee est le Cyfluthrine-Malathion ou KINIKINI a la dose de 100 cc ou 1 litre a l'hectare.

Les semences seront traitees au Super HOMAI avant semis pour limiter les pertes de plants apres levee (fontes de semis, attaques de depredateurs divers du sol) a la dose de 20g/100g kg de niebe.

La conservation des produits de recolte se fait par divers procedes :

- Traitement par l'Actellic ou le Sofagrain a la dose de 50 g/100 kg de niebe.
- Conservation a l'aide d'huile vegetales, notamment l'huile extraite de la graine de NEEM.
- Traitement a la Cendre, etc puis conservation dans des des futs etanches ou jarres etc.

* EN AGRONOMIE

Densite de semis :

- Varietes semi-erigees : 60 cm x 20 cm.

- Varietes erigees : 50 cm x 20 cm.
- Fertilisation : N_{10} P_{40} K_{30} - Le potassium n'est pas indispensable au Nord

*PRODUCTION DE SEMENCES

Dans le systeme traditionnel de production, il n'existe generalement pas de parcelles specifiques destinees a la production semenciere. Les semences sont prelevees directement dans les camps destines a la consommation. Le coix porte le plus souvent sur les gousses saines qui sont ensuite exposees en bottes dans les cuisines ou la fumee qui s'y degage assure leurs sechage et protection.

Par contre dans le systeme moderne de production semenciere, on distingue plusieurs niveaux de production que nous laissons pours laissons pour memoire etant entendu qu'ilsne sont pas encore operationnels au Benin pour des contraintes de divers ordres. Toutefois signalons que les Stations de Niaoli et d'Ina produisent des semences de pre-base qui sont destinees aux organismes de developpement qui les multiplent en semences commerciales pour fins de vulgarisation.

Tous ces acquis ont permis de mettre au point un certain nombre de technologies qui sont actuellement diffusees en milieu paysan (cf fiche technique Culture du niebe en annexe 1 au present document), technologies qui ont favorise l'accroissement de la production et des superficies emblavees ces dernieres annees (cf tableau de l'evolution des superficies, redements et productions du niebe en Republique du Benin en Annexe 2).

III - APPUI FINANCIER ET MATERIEL DU GLIP ET DU RENACO AU PROGRAMME NATIONAL DE RECHERCHE SUR LE NIEBE AU BENIN.

3.1 - Contribution Financiere Du Renaco

De Septembre 1989 a Novembre 1993, le RENACO a verse a l'Institut National des Recherches Agricoles du Benin la somme de UN MILLION SEPT CENT TRENTE CINQ MILLE TROIS CENT VINGT FRANCS CFA (1.735.320 F CFA) pour l'execution des travaux menes par la Station de Niaouli dans le Cadre du Reseau.

Le Tableau I fait le point des versements successifs operes par le RENACO DURANT LA PERIODE MENTIONNE (1989 - 1993).

3.2 - Contribution Financiere et Materiel Du GLIP IITA - Ibadan

Le Programme de Recherche sur les Legumineuses a graines de l'IITA-IBADAN a fourni une assistance financiere et materielle substantieele au Programme National Niebe du Benin.

Cependant, il est aujourd'hui difficile de faire le point financier de cette assistance étant bien entendu qu'il ne s'agissait pas de versements globaux mais de petits versements en fonction des travaux immédiats à réaliser ou déjà effectués tels que l'achat de carburant pour les tournées, le paiement de la main d'œuvre occasionnelle recrutée sur place et le per diem aux chercheurs et techniciens.

Par contre, en 1992, le Programme GLIP a fourni à la station de Niaouli un certain nombre de matériel d'expérimentation consigné dans le tableau.

Tableau I: Relevé récapitulatif des fonds envoyés au Programme national niébé du Bénin par le Renaco de 1989 à 1993.

Date	Montant (F CFA Anciens)
27 - 09 - 1989	174. 000
06 - 03 - 1991	250. 000
03 - 09 - 1991	285. 000
31 - 12 - 1991	285. 000
22 - 09 - 1992	240. 000
23 - 11 - 1993	500. 520
Total	1,735.320

Tableau 2: Liste du matériel fourni à la station de Niaouli par le Programme GLIP - IITA - Ibadan (juillet 1992).

DENOMINATION	QUANTITEE
Appareil de traitement à dos	1
Paires de gants	3
Protège -nez	3
Cynrbus	10 litres
Sherpa Plus	20 litres
Actellic Poudre	1 kg
Thiodrene	1 litre
Benlate	1 kg
Galex	5 litres
Gramoxone	5 litres
Ruban (200 mètres)	1
Grands sacs en polyéthylène blanc	250
Sacs moyens en polyéthylène blanc	250
Sacs en toile	250
Enveloppes de pollinisation	1000
Etiquettes	500
Marqueurs	24

Par ailleurs, le GLIP, à travers le Programme de formation de l'IITA a contribué en 1992 pour la formation de deux chercheurs Béninois en matière d'organisation et de gestion de la production semencière et puis d'un chercheur en recherche et transfert de technologies du niébé et du soja.

IV - CONCLUSIONS

Les diverses assistances fournies par le GLIP et le RENACO au Programme national de recherche sur le niébé au Bénin ont largement contribué à l'obtention des acquis de recherche mentionnés dans ce document. Toutefois, une assistance plus consistante, aussi bien du Réseau que du GLIP, serait vivement souhaitée étant entendu que beaucoup d'efforts doivent encore être déployés pour bien promouvoir la production/productivité du niébé en milieu paysan.

En effet, les variétés adaptées à nos diverses zones agro-écologiques ont pu être certes identifiées à partir de cette collaboration. Mais, le problème du fort parasitisme du niébé par les insectes, les maladies et le Striga, demeure encore presqu'insoluble. La sélection et les criblages devront donc se poursuivre pour lever ces contraintes.

Des méthodes de lutte biologique appropriées contre les divers déprédateurs du niébé devront être envisagées pour pallier les goulots d'étranglement. De même, une filière semencière et un circuit de commercialisation dynamiques pour le niébé assureront certainement l'essor de la production du niébé en République du Bénin.

ANNEXES

REPUBLIQUE DU BENIN
MINISTERE DU DEVELOPPEMENT RURAL
INSTITUT NATIONAL DES RECHERCHES AGRICOLES
DU BENIN

FICHE TECHNIQUE

CULTURE DU NIEBE

ANNEXE 1

I - GENERALITES

1.1 - Nom

- Scientifique : Vigna unguiculata L
- Français : niébé
- Local : Ayikoun (fon)
  Souyi (bariba)

1.2 - Ecologie

- Pluviométrie : 370 a 800 mm
- Température : 25 a 28°C d'optimum
- Eclairement : Le niébé est une plante de jour court qui supporte bien les associations de culture
- Sols : Profonds et bien draines. Eviter les sols trop riches en humus et hydromorphes.

1.3 - Précédents culturaux : céréales

En cas d'infestation du sol par le Striga, le précédent sorgho est à éviter.

PREPARATION DE SEMENCES

Avant semis, traiter avec un insecticide fongicide tel que le thioral à raison de 50 g pour 10 kg de graines.

II - TECHNIQUES CULTURALES

- **PREPARATION DES SOLS**

Labour profond de 25 à 30 cm. En cas de labour manuel, atteindre au moins 10 cm de profondeur. Sur les terres de barre dégradées, confectionner des billons de 20 à 25 cm.

- **SYSTEME DE CULTURE**

Association possible avec le mais, le manioc, le sorgho.

- **FUMURE**

N_{10} P_{40} K_{30}. Au nord le potassium n'est pas indispensable.
Les types d'engrais pouvant être utilises sont l'urée, le superphosphate triple et le chlorure de potassium.

- **PERIODE DE SEMIS**

Au Sud du 15 au 30 mai au premier cycle et fin août à début septembre au second cycle.

Au Nord dans la troisième décade de juillet pour l'extrême nord et dans la première quinzaine d'août pour les localités du sud.

• QUANTITE DE SEMENCES

20 à 30 kg à l'héctare.

• DENSITE DE SEMIS

50 cm x 15 cm soit 134.000 plants/ha pour les variétés de petite taille et 60 cm x 20 cm soit 83.500 plants/ha pour les variétés de grande taille.

• ENTRETIEN

1 er sarclage : 15 à 20 jours après le semis.
2eme sarclage : 20 à 25 jours après le 1er sarclage

• TRAITEMENT PHYTOSANITAIRE

1er Traitement	:	10 à 15 jours après le semis s'il y a présence d' insectes défoliateurs ou de pucerons (facultatif).
2eme Traitement	:	Dès apparition des boutons floraux (obligatoire).
3eme Traitement	:	10 à 15 jours après le deuxième traitement (obligatoire).
4eme Traitement	:	10 a 15 jours après le 3eme (facultatif) devient obligatoire en cas de forte pression parasitaire ou si ce sont des variétés à croissance indéfinie.

• PRODUITS RECOMMANDES

* Decis + Malathion à raison de 1200 cc/ha soit un mélange de 800 cc de Malathion et de 400 cc de Decis pour une application.

* Kinikini àla dose de 1000 cc/ha.

• APPAREILS DE TRAITEMENT

ULV ou appareil à dos (T 15 ou Solo).

• RECOLTE

La maturité se détermine par le jaunissement des gousses. La récolte peut débuter quand 75% des gousses sont mûres.

3 - CONDITIONNEMENT ET STOCKAGE

- Sécher immédiatement après récolte.
- Procéder au battage, vannage et triage.
- Traiter avec l'actellic poudre 2% à raison de 50 g pour 100 kg de niébé.
- Conserver dans des fûts, des bidons, des sacs de jute ou des sachets plastiques quand le taux d'humidité est de 8 à 10%.

4 - SOUS-PRODUCTS

Gâteaux, légumes.

REUNION DE PROGRAMMATION DU RENACO
OUAGADOUGOU-BURKINA FASO, 12-13 SEPTEMBRE 1994

LA RECHERCHE SUR LE NIEBE AU CAMEROUN: Acquis, Travaux en cours et Perspectives d'avenir.

Chevalier ENDONDO *

I- INTRODUCTION

Le niébé (*Vigna unguiculata*) constitue l'une des principales sources de protéines tant pour les masses paysannes que pour les animaux de la partie septentrionale du Cameroun; région située entre le 8e et le 12e degré nord et au climat soudano-sahélien. Il est cultivé à 70% en association culturale avec les céréales : sorgho mil. La production du niébé fait face à plusieurs contraintes dont:

- Le climat ; pluviometrie insuffisante et mal répartie.
- La pauvreté physique et chimique des sols.
- Les insectes et autres pestes.
- L'absence des variétés locales à haut rendements
- Les techniques et systèmes de cultures non améliorés.

Pour lever ces diverses contraintes, les principaux objectifs suivants doivent être atteints

- Mettre au point des variétés à haut potentiel de rendement, résistantes aux pestes, adaptées et acceptées par les agriculteurs.
- Développer des techniques et systèmes de cultures améliorés pour la culture pure et/ou la culture associée.
- Développer des méthodes de stockage appropriées pour les agriculteurs à faibles revenus.

II- PRINCIPAUX ACQUIS DE LA RECHERCHE

La recherche sur le niebé a bénéficié de 3 sources de financement :

- Le Projet **CRSP** dont le financement dans sa 2e phase est axé prioritairement sur la recherche sur le stockage du niébé.
- Le Projet **NCRE** dont le financement arrêté était axé sur la sélection et l'amélioration.
- Le Projet **Garoua** finance les aspects agronomie, sélection et amélioration varietales.

Les principaux acquis sont donc les suivants :

---

*Chevalier ENDONDO, Agronome Légumineuses, Coordonnateur National Niebé.
Institut de la Recherche Agronomique (IRA) BP 33 Maroua, Cameroun

Confirmation de l'effet positif du billonnage cloisonné sur le rendement du niébé: les augmentations de rendement sont de l'ordre de 60% pour les variétés photosensibles, à cycle long (plus de 90 jours) et à port rampant et de 32% pour les cultivars non photosensibles à cycle moyen (moins de 90 jours) et à port érigé ou semi-érigé. Cependant cet effet est attenué en période de très bonne pluviometrie.

Nous conseillons pour la culture du niébé un semis à plat suivi d'un billonnage cloisonné 3 semaines après le semis, le billonnage se faisant tous les 4 - 5 m.

Détermination de la date de semis du soja dans le Sud-Est bénoué : la période allant du 15 Juin au 30 Juin est la meilleure pour le semis dans cette zone.

Identification de 2 cultivars de niebé IT88DM-363 et IT90KD-277-2 à haut potentiel de rendement, se comportant bien, tant en association culturale avec le sorgho qu'en culture pure. Ces cultivars baptisés GLM 92 et GLM 93 font l'objet de tests dans les essais d'associations niebé/sorgho et niebé/cotonnier.

Le cultivar IT81D-985 baptisé BR1 et la variété locale VYA ont été identifiés et vulgarisés.

Developpement de méthodes de stockage de niebé. A savoir:
Le traitement (désinfection) solaire, le triple ensachage et le stockage dans la cendre.

De nombreux croisements faisant intervenir des introductions de l'IITA et de cultivars locaux ont été effectués.

III- TRAVAUX EN COURS

AGRONOMIE

Associations culturales

La culture associée est largement pratiquée par les paysans de la zone tropicale et subtropicale. Une amélioration de ce système de culture aura un impact net sur les populations rurales principales bénéficiaires de ces innovations, en plus des avantages évident de l'association avec les légumineuses au niveau de l'amélioration du statut azoté du sol, de l'incidence sur les maladies et pestes, une augmentaion des rendements des cultures associées est attendue. L'intégration des légumineuses dans un système de culture à base de céréales constitue l'amorce d'une agriculture durable.

Dans l'Extrême-Nord du Cameroun, plus de 70% de planteurs cultivent le niébé en Association culturale avec le sorgho et le mil. On note actuellement une tendance à la pratique de l'association niébé + cotonnier par les paysans.

Les divers avantages liés à des telles associations sont limités par des facteurs non maîtrisés tels que les densités de semis, les dates de semis, les arrangements spatiaux, les combinaisons variétales et la protection phytosanitaire inapropriés.

Pour lever ces divers contraintes nous menons avec le concours de l'IITA/KANO des travaux sur diverses associations culturales pratiquées par des paysans afin de leur proposer à moyen terme un paquet de Technologie améliorée et appropriée.

Fertilisation du Niébé

La plupart des sols sous culture de niebé dans la zone septentrionale du Nord-Cameroun sont caractérisés par une fertilité relativement faible.

Dans le but d'optimaliser la production de niébé en culture pure dont les surfaces sont de plus en plus en extension, une étude sur la fertilisation de niébé s'est averée indispensable afin de déterminer la formule **NPK** susceptible d'optimaliser le rendement du niébé, La dose de **P** étant le facteur le plus important dans cette étude.

Développement de la Culture du Soja dans le Sud-Est Bénoué

Les populations du SEB manifestent de plus en plus leur interêt à la culture du Soja dont la production est en majorité commercialisée. La société MAISCAM basée à Ngaoundéré étant le principal acquereur de leur production.

Mais ces populations. sont confrontées aux problèmes de la non adaptabilité de certains cultivars, de la mauvaise qualité de la récolte résultant de la non maîtrise de certains facteurs comme la date de semis, les techniques culturales.

Des étude sont donc menées sur la culture du soja dans le SEB. Etudes qui permettront de mettre à brève échéance à la disposition des paysans des semences améliorées et des techniques de culture appropriées.

SELECTION

Identification des variétés adaptées et à haut potentiel de rendement:

L'objectif principal est d'identifier des variétés de niébé à haut potentiel de rendement et adaptées aux régions septentrionales du Cameroun et acceptées par les agriculteurs.

La mise en place des variétés ayant de rendements stables et élevés permettra une augmentation de la production dans la région. Etant donné l'existence des marchés frontaliers (surtout des marchés nigerians), le niébé confirmera sa tendance à devenir une culture de rente et par conséquent être une source de revenu pour les petits agriculteurs.

Le materiel végétal est constitué essentiellement des introductions de l'Institut International d'Agriculture Tropicale (IITA) et du RENACO.

Epuration variétale et production des semences

Les variétés vulgarisées BR1 et VYA connaissent de plus en plus une chute de rendement et une augmentation de leur susceptibilité vis à vis des viroses. On assiste également à une demande en semences de plus en plus croissante, d'où la necessité de purifier et de multiplier les semences de ces 2 variétés.

Evaluation du germplasme et developpement variétal

L'évaluation du germplasme a pour objectif de maintenir un reservoir génétique devant servir aux choix des parents pour d'éventuels croisements. Afin de répondre aux contraintes du milieu et aux exigences de la population, le developpement de nouvelles variétés a été mis sur pied.

STOCKAGE

Trois méthodes de stockage de niebé ont été developpées:

1- **La désinfection solaire**, qui consiste à un traitement du niebé par l'energie solaire et permet de tuer tous les stades de developpement de la bruche (*Callossobruchus maculatus*) avant tout stockage.

2- **Le triple ensachage**: le niebé est stocké dans 3 sacs plastiques étanches enfoncés l'un dans l'autre.

3- **Le stockage dans la cendre**: le niebé est stocké dans la cendre à l'aide des canaris à raison d'un volume de niebé pour un volume de cendre.

Toutes ces méthodes ont passé le stade de prévulgarisation et sont actuellement en vulgarisation auprès des paysans.

IV- PERSPECTIVES

Mettre en place un système d'associations culturales niebé/sorgho et niebé/cotonnier qui permette aux paysans de benéficier des divers avantages liés à ce genre de pratique. Ceci avec le concours de l'IITA.

Permettre aux paysans d'augmenter quantitativement et qualitativement leurs productions par une utilisation judicieuse des engrais et des pesticides.

Permettre l'adaptation aux niveau regional à écologie similaire des pratiques et systèmes culturaux améliorés.

Mettre à la disposition des paysans des variétés de niébé à hauts rendements, résistantes aux maladies, insectes et autres pestes. Avec également le concours de l'IITA et du RENACO.

Poursuivre auprès des paysans la vulgarisation des méthodes de stockage de niebé.

REPUBLIQUE DU NIGER

MINISTERE DE L'AGRICULTURE
ET DE L'ELEVAGE

INSTITUT NATIONAL DE RECHERCHES
AGRONOMIQUES DU NIGER

PROGRAMME CULTURES PLUVIALES

PROJET AMELIORATION DE LA CULTURE DU NIEBE AU NIGER

LE POINT DE LA RECHERCHE ET OPERATIONS 1994/1995

PRESENTE PAR:

Mr MOUTARI ADAMOU, CERRA/KOLLO, INRAN BP 429 NIAMEY/NIGER

A LA

REUNION DES REPRESENTANTS DES PROGRAMMES NATIONAUX
DE RECHERCHE SUR LE NIEBE ET DE L'IITA / SAFGRAD

Ouagadougou, du 11 au 13 Septembre 1994.

I. INTRODUCTION

Le niébé est la principale légumineuse alimentaire au NIGER. Cultivé (essentiellement en association et dans une moindre mesure en pure) sur plus de 2,6 millions d'hectares en 1991, il occupe la deuxième place après le mil (4,39 millions d'hectares). La production annuelle nationale était alors d'environ 430 000 tonnes (DEP/MAG-EL). La croissance ou la stabilité de celle-ci au cours des dix dernières années semblent exclusivement liées à l'accroissement des superficies cultivées puisque le rendement moyen y est resté relativement faible (inférieur à 200 Kg/ha).

Le développement de la culture du niébé au Niger s'explique par son intérêt multiple dans les différents systèmes de productions: sécurité alimentaire apport de protéines, source de revenus, amélioration de la fertilité et protection des sols, fourrage...

Les raisons essentielles de sa faible productivité sont:

1. Le parasitisme: insectes, Striga, maladies ...
2. La pauvreté et la dégradation des sols: peu ou pas du tout d'apport de fumure
3. Les sécheresses (notamment de fin de cycle) très dommageables aux variétés traditionnelles souvent tardives
4. Les pratiques culturales traditionnelles: faibles densités de semis du niébé dans les systèmes de cultures associées.
5. Approvisionnement en intrants/commercialisation

II. PRINCIPAUX OBJECTIF, STRATEGIE ET APPROCHE

L'objectif principal est l'amélioration de la productivité et la valorisation du produit. Pour cela la stratégie utilisée est le renforcement des activités multidisciplinaires tant en stations qu'en milieu paysan, et le développement de la coopération avec les partenaires: vulgarisateurs, paysans, Université A.M., IITA, RENACO, SNRA, Projets de développement, ONG... L'approche repose sur la consolidation des acquis et l'amélioration des systèmes de cultures associées et pures en privilégiant la lutte contre les ennemis de culture.

III. PRINCIPAUX RESULTATS

1. Maintenance de germoplasme

Plus de 500 accessions (écotypes locaux, introductions et lignées élites de sélection) sont entretenues en congélateurs ou sous forme de collection vivante.

2. Sélection

Quatre variétés locales améliorées sont en vulgarisation: TN 5-78, TN 27-80, TN 88-63 pour la zone 300-600 mm de pluie et TN 3-78 pour la zone enregistrant plus de 600 mm. Quatre autres prometteuses sont en essais avancés ou en prévulgarisation: TN 28-87, TN 256-87, TN 2-90, Farin Waké.

Plusieurs lignées sélectionées localement ou introduites sont prévulgarisées: IN 88A-25, IN 88A13-7, KVX 30-309-6G, KVX 100 2.

3. Entomologie

Deux traitements chimiques se sont revélés économiquement rentables en culture pure du niébé. Plusieurs lignées prometteuses descendant de IT 84S-2246-4 sont en train d'être criblées pour la résistance aux aphides. La culture associée mil/niébé permet de réduire significativement l'attaque des Thrips des fleurs comparativement à la culture pure et de préserver les populations d'ennemis naturels autochtones. Quatre lignées TN 93-80-B, IN 88A-8-1, IN 89E-1 et IN 92F-32 ont montré un bon comportement en criblage pour la résistance aux bruches. 1335 paysans enquêtés dans 153 villages (6 départements sur 7) ont permis d'inventorier 56 espèces locales (dont 7 principales) utilisées dans la conservation traditionelle du niébé. Les travaux devraient permettre de proposer à la vulgarisation des méthodes alternatives de conservation.

4. Pathologie / malherbologie

Cinq variétés ont été identifiées ou confirmées comme ayant une bonne résistance au Striga gesneriodes: TN 121-80, TN 93-80, TN 5-78, IT 82D-849 et B 301. Les 2 premières ayant un bon potentiel de rendement seront bientôt en prévulgarisation en zone à Striga. Les 2 dernières sont utilisées comme géniteurs de résistance au Striga dans les croisements. Plusieurs autres lignées issues de ces croisements ou introduites de l'IITA se sont revélées très prometteuses.

Environ 300 accessions du germoplasme ont été criblées pour la résistance au Macrophomina phaseolina en vain. La collaboration dans ce sens est très active entre l'INRAN, l'U.A.M. et l'IITA.

5. Agronomie

Les principaux résultats des études menées sont:

En culture associée le délai optimum de semis du niébé est de 7 à 14 jours après le semis du mil.

Les variétés semi-rampantes de cycle intermédiaire (70-80 jours) comme la TN 5-78 conviennent mieux pour un système de culture associée.

En zone à pluviosité faible à moyenne (300-500 mm), le semis du niébé en pure en juin est meilleur alors qu'en zone plus humide celui de juillet est plus favorable.

Les écartements de 80 cm et 40 cm respectivement entre les lignes et les poquets sont meilleurs en culture pure.

6. Technologie alimentaire

Des enquêtes menées dans plusieurs régions du pays ont permis de recencer 19 méthodes de transformation locale du niébé, classées en 7 groupes. Les investigations en cours devraient permettre d'améliorer la qualité nutritionelle du niébé.

IV. PROJET AMELIORATION DE LA CULTURE DU NIEBE AU NIGER / 1994-1995

O P E R A T I O N S	C O N T R A I N T E S	O B J E C T I F S
01. Tests en milieu paysan de nouvelles variétés améliorées de niébé (pour adaptation, résistance au Striga)	Difficultés de diffusion des nouvelles technologies	Evaluation de l'adaptabilité et transfert de technologies en milieu paysan
02. Validation en milieu paysan de quelques méthodes de conservation du niébé grain	"	"
03. Analyse de la rentabilité économique du traitement chimique contre les insectes en culture pure du niébé en milieu paysan	"	"
04. Test des techniques culturales améliorées (densité, fumure) en milieu paysan	"	"
05. Test de dégustation de nouvelles variétés de niébé en milieu paysan	"	"
06. Développement de méthodes de lutte intégrée contre le Striga du niébé	Absence de méthodes de lutte appropriées	Mise au point de méthodes lutte peu couteuses less expensive
07. Développement de méthodes de lutte intégrée contre les insectes nuisibles (pucerons, thrips, punaises)	"	"
08. Développement de variétés de niébé pour la production de grain et/ou fourrage en système de culture associée avec les céréales	Variétés souvent tardives et inadaptées à l'objectif visé et au système de culture	Mise au point de variétés pour la production de grain et/ou fanes en association
09. Amélioration de la qualité nutritionnelle et incorporation du niébé dans la fabrication des aliments pour bébés	Présence de facteurs antinutritionnels et malnutrition / enfants ruraux en sevrage	Réduction des facteurs de flatulence et mise au point d'aliments substituts pour sevrage
10. Développement de variétés adaptées à la contre saison	Variétés tout-venant en contre saison / inadaptation au froid	Identifier des variétés adaptées à la C/S

ACRONYMS AND ABBREVIATIONS

BRU	Biotechnology Researcy Unit
GLIP	Grain and Legume Improvement Program
IAR (ABU)	Institute of Agricultural Research (Ahmadu Bello University) (Nigeria)
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
INERA	Institute of Agricultural Studies and Research
INRAB	Institut National des Recherches Agricoles du Bénin
INRAN	Institut National de Recherches Agronomique du Niger
IRA	Institut de la Recherche Agronomique (Cameroon)
MSP	Moist Savanna Program
OAU/STRC	Organisation of African Unity - Scientific, Technical and Research Commission
PHMD	Plant Health and Management Division
RCMD	Resource and Crop Management Division
SAFGRAD	Semi-Arid Food Grain Research and Development
SARI	Savanna Agricultural Research Institute (Ghana)
USAID	United State Agency for International Development

1994-09

Proceedings of the Planning Meeting 1994/95 (RENACO)

AU-SAFGRAD

AU-SAFGRAD