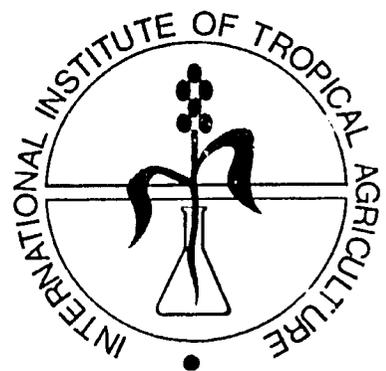


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REPUBLIC OF CAMEROON
MINISTRY OF SCIENTIFIC AND
TECHNICAL RESEARCH
(MRST)
INSTITUTE OF AGRICULTURAL RESEARCH
(IRA)

National Cereals Research and Extension Project (NCRE)

SEMI-ANNUAL REPORT
1993



United States Agency for International Development
(USAID)
Institute of Agricultural Research
(IRA)
International Institute of Tropical Agriculture
(IITA)

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EXECUTIVE SUMMARY

Administration

A total of 5 TAs left the project during this period. As each TA left the country their counterparts took over responsibilities for scientific, financial and materials management of the units. A Project Implementation Committee meeting in June approved reorientation of certain project activities to increase impact during the remaining time. Additional responsibilities were assigned to some staff to reflect these changes. Further adjustments to project objectives continue. Fifteen IRA/NCRE pamphlets were printed and distributed during this period. Seed multiplication efforts were reinforced and formalized.

Highland Maize Breeding

The Highland Maize Breeding Unit continued planned activities. Planned collaboration with Pioneer and IITA were not accomplished. Irregular rains have resulted in poor stands in some locations. Normal data collection is proceeding on all trials.

Lowland Maize Breeding

During the 1993 cropping season, the lowland maize breeding unit is carrying more than 170 trials in both the savanna and forest zones. These trials include more than 200 genotypes distributed over 15 locations. Major activities under investigation are: Striga tolerance, drought tolerance, acid soil tolerance and productive hybrids for progressive farmers.

Rice Breeding

The rice research units in Dschang, Garoua and Maroua accomplished over 80% of the approved activities in the 1993 plan of work. Two early duration varieties of rainfed rice ITA 257 and IRAT 112 were distributed to farmers around the south East Benoue and North East Benoue areas. Some varieties have also been extended to the Far North.

Cereals Agronomy

A total of five activities were performed in the cereal agronomy unit in Garoua. Four of these activities were on-station and one in farmers' fields. On the whole, the performance of all the trials has been good and observations are being recorded despite the tight financial situation.

Sorghum and Millet

In the Sorghum and Millet Program, a large number of diverse breeding lines, elite varieties, preliminary lines and sources of resistance to various stress factors were planted. Selected germplasm accessions and advance breeding lines are under multilocation trial. A crossing program involving local adapted lines, exotic lines and sources of resistance to stress factors have been organized. Particular emphasis is placed on striga/varieties development and testing. Pearl millet work includes evaluation of local germplasm and mass selection, evaluation of elite breeding material received from other programs to diversify the genetic base of the breeding program.

Bambui TLU

To date, the TLU Bambui successfully accomplished the majority of its activities: soil map for the NWP completed, 283 trials implemented, training of extension staff, backstopping of maize seed producers. Two important surveys will be carried out starting September.

Ekona TLU

A study to evaluate farmers decisions and constraints with respect to agroforestry has just been done in the Peace Corps villages. Focus village meetings took on a new orientation moving from researcher-farmer to farmer-researcher. In the area of technology evaluation, a retention survey of sweet potato is meant to provide information similar to those for the maize and cassava production and marketing constraints. The contribution of variety or fertilizer to higher maize yield varied with focus village and cropping history. While hedge row alleys gave stable maize yield in an alley system, N application resulted in lowered grain yields over time. Instead of formal workshops Ekona TLU now provides resource personnel in NAETP Training workshops and in other similar institutionalized trainings.

Maroua TLU

With emphasis on farmer participation, TLU Maroua has embarked on a new approach that is expected to reinforce linkages with farmers and collaborators in the extension service. Research themes are now well focussed and more relevant to the farmers' needs while the whole process of technology development and dissemination is becoming cost-effective.

Nkolbisson TLU

TLU Nkolbisson has been involved in Agroforestry and fallow research for maintaining and improving soil fertility. A rapid appraisal survey in two research villages in the South Province has been completed. Dissemination of technologies to farmers has received particular emphasis. Data collection and analysis are in progress.

Economic Analysis

The main activities of the Economic Analysis Unit were (1) coordinating research programming for the Cereals and Farming Systems program and (2) organizing two workshops--on resource management and on research evaluation. Progress was made on a TLU evaluation study and several working papers for IRA Research Services. Two surveys were started: one on researchers' outputs, the other on farmers' priorities. A seed policy initiative was developed. The work plan was modified to incorporate new duties related to research programming, restructuring, seed policy, and commercialization.

Soil/Agroforestry

During this first half of the year 1993, all trials planned were carried out. The project received various visitors. The outreach activities were broadened through more on-farm trials conducted owing to the reorientation of the program objectives to go more on-farm, support PCV's activities, coordinate NGOs engaged in agroforestry and soil fertility related conservation work, and stretch its mandate area to cover other Provinces in addition to the West and North-West provinces. Trials will be harvested, and data analyzed in view of compiling the annual report.

Grain Legume

In the Grain Legume Unit, the preparation of planting material and experimental field has been done. Ninety percent of the cowpea and soybean trials have been planted at Guiring (11 trials), Guetalé (4 trials) and Sangueré (5 trials). We could not plant all our trials because of transportation problems.

Plant Pathology

Seventeen trials were planted in 6 locations. Some failed (about 15%) due to natural stress. The plants were artificially inoculated using spore suspensions of *E. turcicum* and *Puccinia polysora*. Powder inoculum was used for *Phaeosphaeria maydis*. Disease incidence and severity were recorded weekly starting 15 days after inoculation until physiological maturity. MBB, MBN and TLB's trials were evaluated nation-wide. While *Puccinia polysora*, and *Bipolaris maydis* remained the major diseases in lowlands, common smut (*Ustilago maydis*) is becoming a serious treat to maize farmers in the humid forest. Head smut (*Sporisorium reilianum*) remains a great concern in the highlands. Three "unknown" diseases were recorded this year. The collaboration with other units and institutions was excellent. IITA supported the unit in a disease and pest survey in 6 provinces of the country. The number of personnel in the unit are few and need more training.

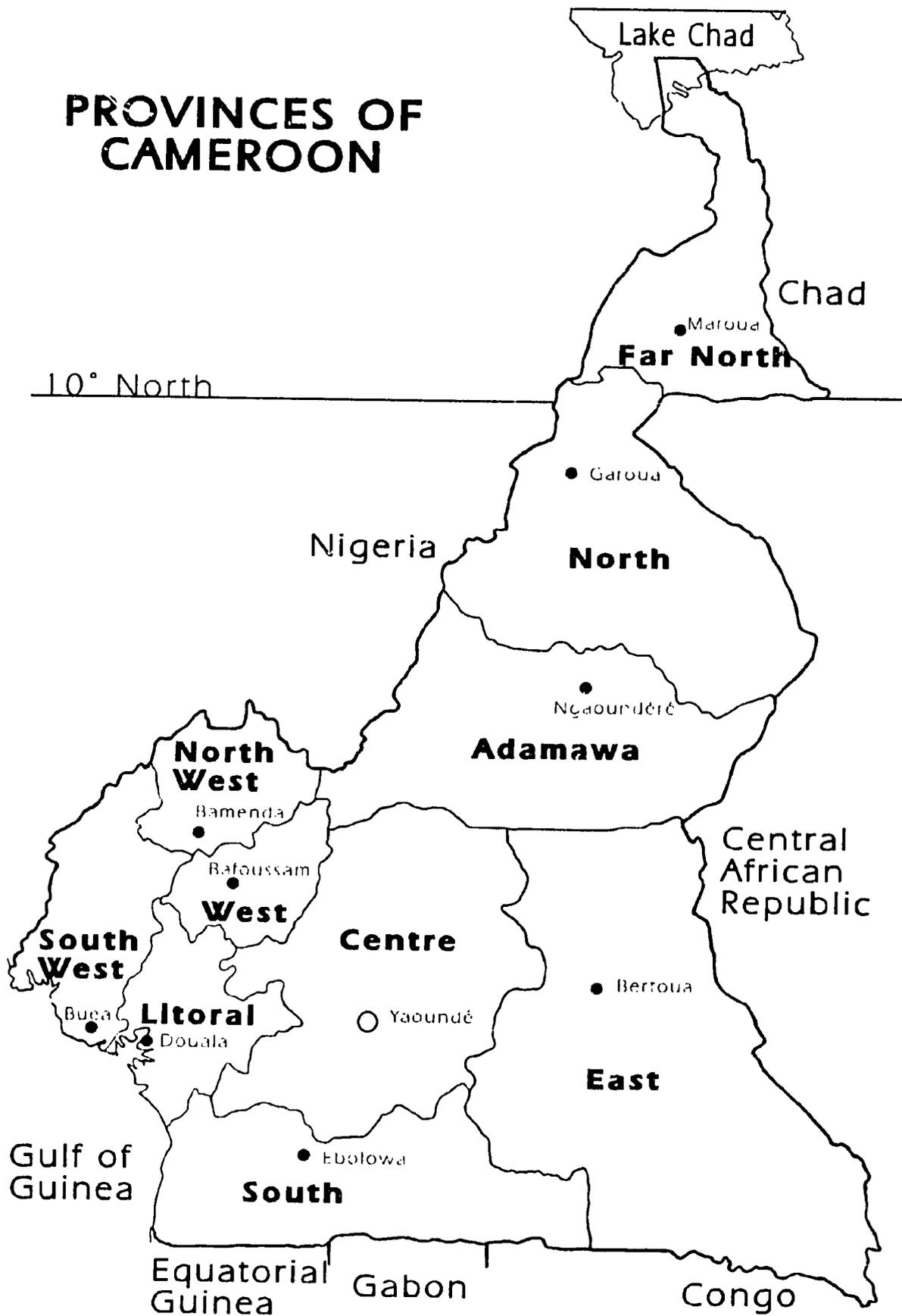
Highland Cereals Entomology

The Highland Cereals Entomology researcher, Mr. C. Asanga, participated in several national and international workshops and training courses both in and out of the country during this period in review. Two of the three operations being executed include farmers grain storage surveys and a study of the use of natural plant materials by farmers for grain storage pest control. Two IPM rice operations were organized in Northern Cameroon awaiting a budget from WARDA for execution since there is no NCRE budget for rice operations in the North.

Lowland Cereals Entomology

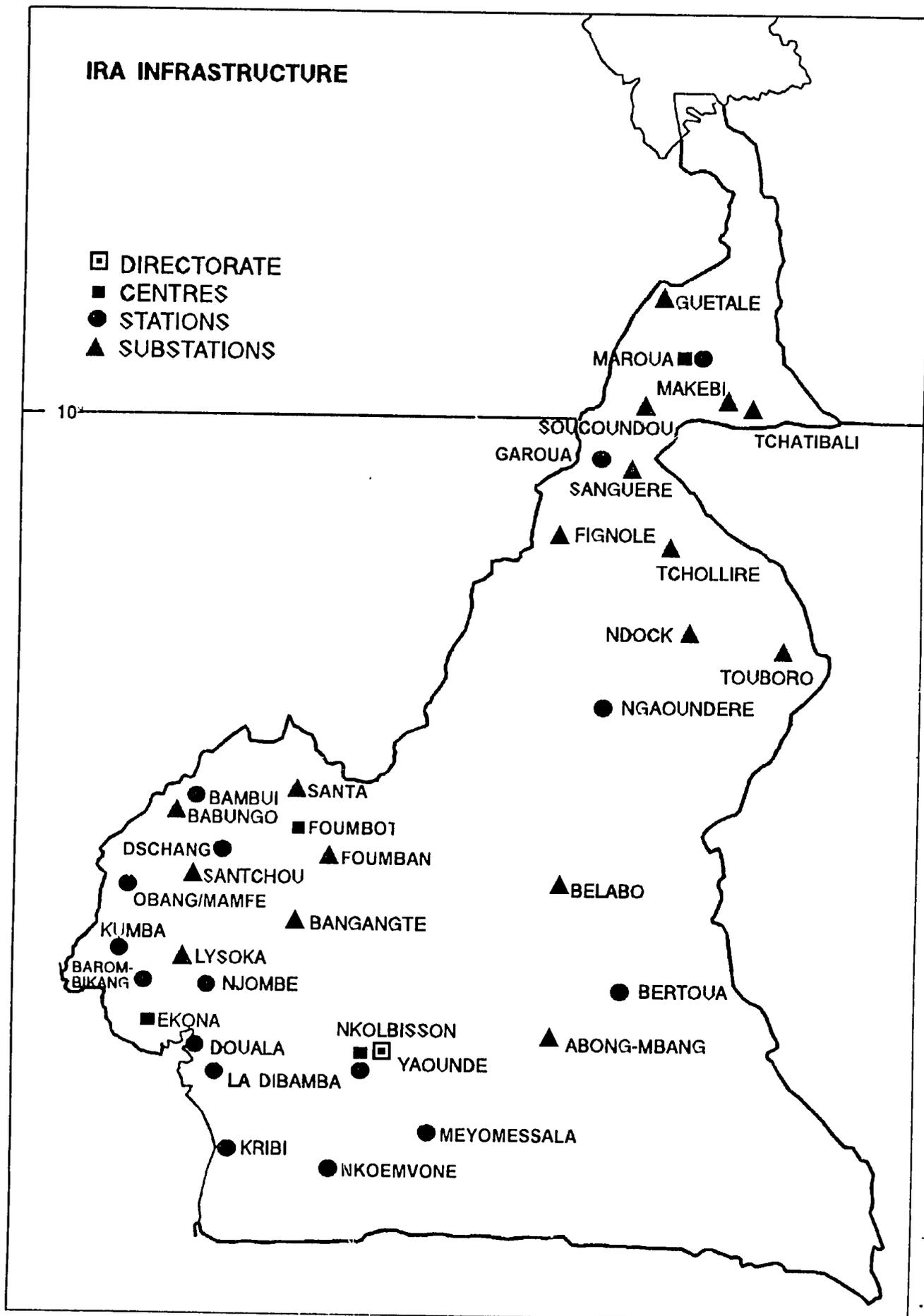
In the Lowland Cereals Entomology Unit many farmers were contacted and many fields visited during a survey to record the reasons and implications of cultural practices on the incidence, severity and losses due to stem borers. Two trials on maize-manioc association were done at Ntui and Yaounde. They were done to evaluate the development of borer attacks on Maize.

PROVINCES OF CAMEROON



IRA INFRASTRUCTURE

- DIRECTORATE
- CENTRES
- STATIONS
- ▲ SUBSTATIONS



DISTRIBUTION MAP OF THE MAIN CEREAL PRODUCING AREAS IN CAMEROON

SCALE : 1/5000000

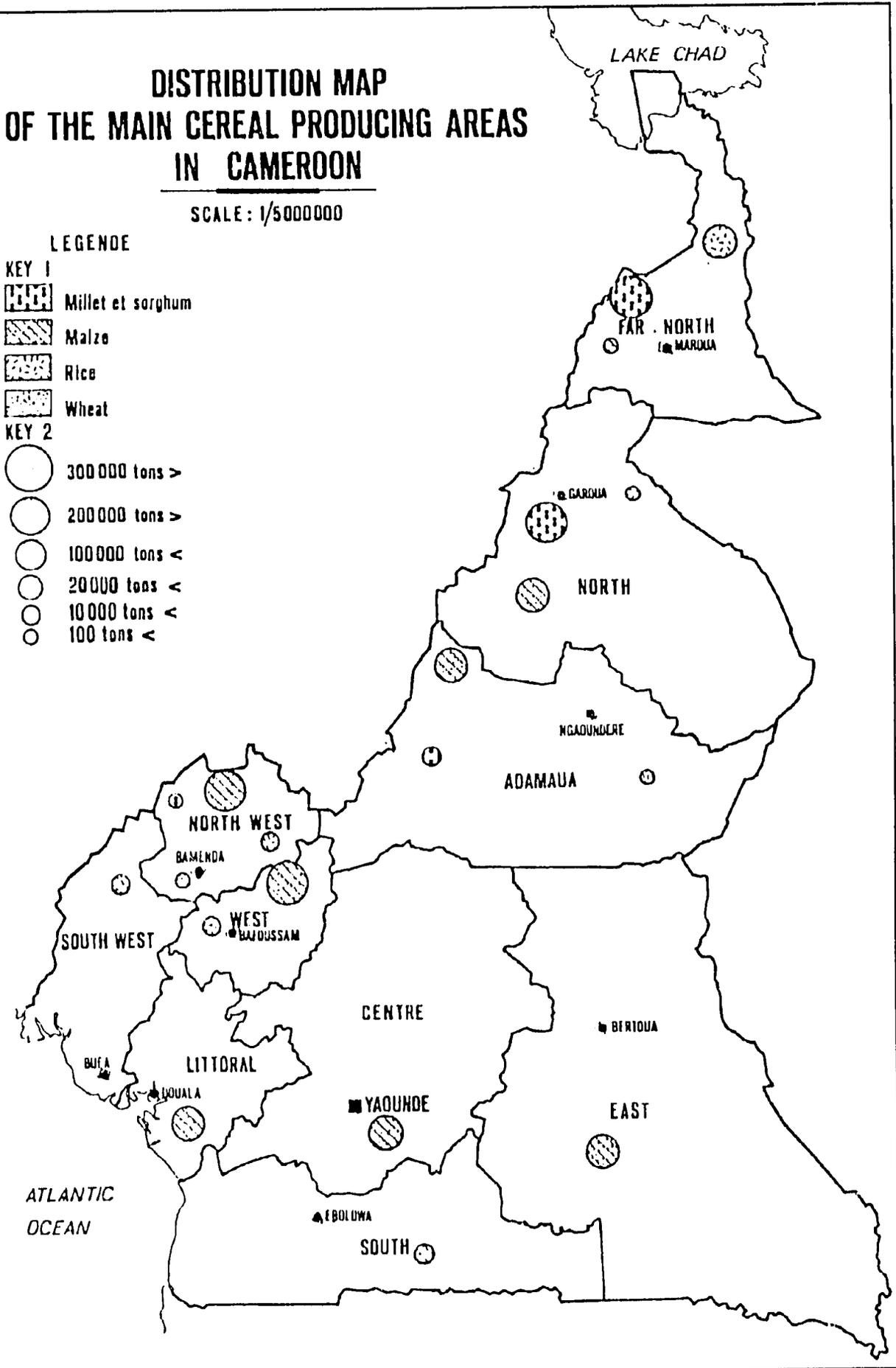
LEGENDE

KEY 1

-  Millet et sorghum
-  Maize
-  Rice
-  Wheat

KEY 2

-  300 000 tons >
-  200 000 tons >
-  100 000 tons <
-  20 000 tons <
-  10 000 tons <
-  100 tons <



1. ADMINISTRATION UNIT

1.1 INTRODUCTION

The Administration Unit consists of the Chief of Party, Deputy Chief of Party, Administrative Officer, and various support staff. The goal of the Administration Unit is to ensure achievement of project objectives. The administration's most important task is assisting researchers so they can accomplish the project's research and in-service training objectives. This entails administrative support to researchers for housing, travel arrangements and necessary formalities with the Government of Cameroon; procurement of necessary supplies and equipment; management and disbursement of project funds; and hiring and supervising support personnel. A particular responsibility of the Chief of Party is to review research work plans, methods and findings in order to ensure good performance of the technical assistance team and consistency with project objectives.

Another important function of the Administration Unit is maintaining liaison among the sponsoring organizations: IRA, IITA and USAID. In this regard, the administration ensures timely and proper preparation of project reporting documents, including annual work plans and progress reports. The administration is also continuing to develop research and technical management procedures which not only meet project requirements but hopefully can serve as models for future use by IRA. Long term training and procurement are two liaison and support activities which are now taking less time than in the past. As the project nears its end, increasing amounts of time are being devoted to ensuring smooth transition after phase out of IITA staff and publication and dissemination of project findings.

1.2 SUMMARY OF ACTIVITIES

During this reporting period many activities centered around the scheduled phase out of long term TAs. The following TAs left Cameroon:

Dr. J. Detongnon	Grain Legumes Unit-Maroua
Dr. O. Osiname	TLU-Bambui
Dr. J. Poku	TLU-Nkolbisson
Dr. R. Carsky	TLU-Maroua
Dr. M. Moussie	TLU-Nkolbisson

As each TA left the country their counterparts took over responsibilities for scientific, financial and materials management of the units. A Project Implementation Committee meeting in June approved reorientation of certain project activities to increase impact during the remaining time. Additional responsibilities were assigned to some staff to reflect these changes. Dr. M. Kamouanga took responsibility for TLU coordinator. Dr. C. Yamoah was assigned responsibilities for agroforestry coordination. Further adjustments to project objectives continue.

Seed multiplication activity within administration started in mid-March. The production of Maize foundation seed and cassava cuttings was organized with maize breeders and Ekona TLU and ROTREP. Field trips to Centre, North West, South and South West provinces helped identify NGOs and cooperatives to collaborate with TLUs in the scheme. Three information pamphlets on maize and maize seed production were prepared.

1.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Research planning and supervision		
1.1 Work plans consistent with IRA and project objectives.	1.1.1 Work plan protocols and review committee.	1.1.1 1993 Work Plan reviewed by joint IRA/NCRE committee.
1.2 High quality execution of research programs.	1.2.1 Visit and review field research activities.	1.2.1 COP visited all locations to review activities
1.3 Smooth transition to IRA staff-led research units.	1.3.1 Coordinate backstopping of IRA researchers.	1.3.1 Counterparts assigned budget control and vehicles as needed.
Operation 2: Liaison between USAID, IITA, and IRA		
2.1 Timely compliance with reporting requirements.	2.1.1 Edit, publish and disseminate project reports.	2.1.1 Annual Plan of Work and 1992 Annual Report completed.
	2.1.2 Organize end-of-tour reports and briefings.	2.1.2 All 5 departing IITA staff gave end of tour reports and debriefings at USAID.
2.2 Discussion and agreement on project goals and actions.	2.2.1 Regular meetings with IRA and USAID officials.	2.2.1 Meetings on weekly basis.
	2.2.2 Quarterly consultation with IITA Ibadan.	2.2.2 Visits to IITA as needed.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	2.2.3 Implementation committee meetings.	2.2.3 Project Implementation Committee meeting held 8 June, 1993.
Operation 3: Personnel, financial and materials management		
3.1 Timely and computerized handling of imprest.	3.1.1 Manage and disburse project funds.	3.1.1 Budgets established for all units. Expenses reimbursed as submitted.
	3.1.2 Compile and forward imprest reports to IITA.	3.1.2 Imprest reports submitted as soon as compiled.
3.2 Complete, computerized list of inventories.	3.2.1 Maintain existing inventory system.	3.2.1 Departing staff inventory checked as they leave. Lists submitted to USAID for transfer to IRA.
3.3 Administrative assistance to save researcher time.	3.3.1 House maintenance.	3.3.1 Routine maintenance performed as needed.
	3.3.2 Travel arrangements.	3.3.2 Reservations made for meetings, leave and termination travel.
	3.3.3 Supplies procurement.	3.3.3 International procurement finished. Local supplies purchased as needed.
3.4 Good support staff performance.	3.4.1 Daily job supervision.	3.4.1 Local employees given weekly task lists.
	3.4.2 Annual evaluations.	3.4.2 Annual evaluations to be completed in December.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 4: Augmentation of project impact		
4.1 Publish and disseminate project results.	4.1.1 Prepare extension bulletins and leaflets.	4.1.1 15 extension leaflets printed and distributed.
	4.1.2 Reprint and distribute research papers.	4.1.2 one research paper reprinted.
4.2 Increase availability of project-developed varieties.	4.2.1 Ensure attention given to breeder seed production.	4.2.1 Breeder seed production part of all work plans.
	4.2.2 Work with TLUs on farm-level seed multiplication.	4.2.2 Seed multiplication programs funded at all locations.
4.3 Improve extension liaison and coordination.	4.3.1 Facilitate IRA staff participation in training, field days, workshops and village meetings.	4.3.1 no activity during this period.
	4.3.2 Backstop IRA coordinator for PNVFA.	4.3.2 Several meetings to plan PNVFA activities.
Operation 5: Commercialize food crop seeds/plant cuttings		
5.1 Institutional development.	5.1.1 Assist to develop National Seed Policy.	5.1.1 Discussions initiated with appropriate MINAGRI personnel.
	5.1.2 Assist in exploring market outlets for seeds.	5.1.2 no progress during this period.
	5.1.3 Consultancies.	5.1.3 Need to identify consultant and propose terms of reference.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
5.2 Provide maize foundation seeds and cassava cuttings to farmers, NGOs and cooperatives.	5.2.1 Collaborate with Maize Breeding Units to produce 3-4 tons Maize foundation seed at Ntui.	5.2.1 Maize foundation seed being produced at Bambui and Ntui.
	5.2.2 Collaborate with ROTREP to produce cassava cuttings at Ekona.	5.2.2 Cassava cuttings being produced by Ekona TLU and ROTREP.
	5.2.3 On-farm demonstration plots through TLUs.	5.2.3 Demonstration plots set up by the TLUs in the research villages.
5.3 Increase quantity and quality of maize and cassava for consumption and/or sale.	5.3.1 Collaborate with TLUs to organize NGOs and farmers into groups in pilot villages.	5.3.1 NGOs and farmer groups identified in each province to multiply seed in the second season.
	5.3.2 Provide guidelines for seed multiplication.	5.3.2 Information pamphlet being edited.
	5.3.3 Organize workshop on quality control and storage.	5.3.3 workshop proposed in collaboration with MINAGRI.

1.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 None during this period.
	1.2 Training	
	1.2.1 In-service	1.2.1 164 participants in computer training courses. Four technicians accepted for HTA courses.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	1.2.2 Long-term	1.2.2 T. Ngoumou completed in-country research. A. Ebete returned from Mississippi State U. All 12 continue with good reports.
2. Extension	2.1 Workshops	2.1 no activity during this period.
	2.2 Publications	2.2 Collaboration with MINAGRI initiated.
	2.3 Field days	2.3 no activity during this period.
3. Miscellaneous	3.1 Administration (personal)	3.1 Local staff reductions done as TAs leave.
	3.2 Leave	3.2 Drs. Atayi, Baker, Stilwell took leave.

1.5 OTHER ACCOMPLISHMENTS

During this reporting period there have been efforts to redirect NCRE efforts to reflect current USAID priorities and objectives. Increased emphasis has been given to seed production by local commercial producers.

2. MAIZE RESEARCH UNIT

2.1 HIGHLAND MAIZE BREEDING

2.1.1 INTRODUCTION

The Highland Maize Breeding Unit is responsible for the development of varieties adapted to 1000 to 2500 meters altitude. The target zones are found in the Northwest, West and Adamaoua provinces, and include a large range of soil types and farm sizes. The Western Highlands, comprising the North West and West provinces, covers less than 10 percent of the land area in Cameroon but produces over 60 percent of the national maize crop.

The goal of the unit is to carry out a comprehensive breeding program which can continuously provide seed of new varieties to seed multiplication and distribution organizations. Substantial progress has been made, particularly in developing and selecting inbred lines, so the unit has now shifted its emphasis to population improvement and selection of open-pollinated and synthetic varieties. A maize streak virus screening facility is now available, so increased attention is being given to developing streak virus resistant germplasm. Breeder and foundation seed is being produced for on-farm testing and the private seed industry.

2.1.2 SUMMARY OF ACTIVITIES

The work in the 1993 cropping season follows this year's work plan. Some adjustments were necessary because cooperative trials with Pioneer Hybrid International and IITA were not carried out due to problems beyond the Unit's control. Funds allocated to these trials were reassigned to other activities like land management at trial sites, the third and last year of Lime x Variety trial and HAP seed increase.

The weather pattern was very irregular at the beginning of the cropping season. Rain came two weeks earlier than expected and stopped by mid-March for 2-3 weeks depending on sites. This had bad consequences at Foubot and Mbiyeh sites with a uniform germination at Foubot, and replanting of part of the trials and nursery were necessary at Mbiyeh. Heterogeneous data is expected at these trial sites. A general consequence of the irregular rainfall was delayed planting of some trials or isolations at Foubot and Babungo. At Santa IRA Sub-Station, late replanting of the trials and HAP S1 lines because of systematic bird damage, failed due to a combination of heavy rainfall and very low temperatures. The Ndu Local seed multiplication is doing better after it suffered hail storm damage during the early stages of growth.

The Mfonta trial site is as usual suffering from the lack of uniformity, despite attempts to manage its acidic soils. Nevertheless, the crop is growing slowly despite the heavy rainfalls of July and August months.

All the data on 50% silking has been collected and plant height data is being collected. Pollinations at Foubot are finished and those at Mbiyeh are to finish before the last week of August.

A newly built seed processing and storage facility was received in April this year. The drying facilities included in the structure as well as the cold seed room are unfortunately not functional because they broke when put into operation.

The two screenhouses at Foubot are now out of use because the plastic roof melted at the contact point with the iron frame, beginning December 1992.

2.1.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1. Develop germplasm		
1.1 Identify and develop source populations.	1.1.1 Nurseries for crossing and selfing.	1.1.1 Foubot nursery (F93A) sown and completely pollinated.
	1.1.2 Preliminary hybrids trials.	1.1.2 Two sets of preliminary hybrids sown at 3 locations.
	1.2 Improve and convert populations through selection and recombination.	1.2.1 High altitude population improvement.
	1.2.2 ATP half-sib selection.	1.2.2 ATP-SR half-sib sown at 2 locations and final selection expected at harvest.
	1.2.3 Early White SR half-sib selection.	1.2.3 Early White SR sown at 2 locations selected families to be known in september after harvest.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1.3 Increase streak resistance.	1.3.1 Early MSR evaluation.	1.3.1 Early trials sown at 2 locations. It would be difficult to identify good families for SR purposes due to the damage caused by other foliar diseases, especially <i>E. turcicum</i> .
	1.3.3 SR screening under artificial infestation.	1.3.3. Not implemented.
Operation 2. Test varieties and hybrids		
2.1 Identify well-adapted varieties through regional testing.	2.1.1 National variety tests (inbreds, high altitude, mid altitude--early and late).	2.1.1 Inbreds sown at 3 locations. High Altitude population (HAP) sown at 2 locations with a crop failure at Santa.
	2.1.2 Advanced hybrids trial.	2.1.2 Mid altitudes early and late sown at 3 locations. Advanced hybrids sown at 3 locations in the mid-altitudes.
2.2 Test and assess introductions.	2.2.1 IITA hybrids test.	2.2.1 Not carried out.
	2.2.2 International progeny testing trial.	2.2.2 Not carried out.
	2.2.3 Pioneer hybrids test.	2.2.3 Not carried out.
	2.2.4 Select and cross introductions from IITA.	2.2.4 Crosses done. Preliminary hybrids are sown and diseases noted.
Operation 3: Varietal maintenance		
3.1 Maintain varieties and increase seed stock.	3.1.1 Ear-to-row selection: Kasai-SR, ATP-SR, NDU-Local, SYN4-W- SR, SYN4-SR-Y.	3.1.1 KASAI-SR and Syn.4-SR-Y already harvested and the seed put in the dry house.
	3.1.2 Multiply (and half-sib select) released varieties.	3.1.2 Seed production of KASAI (2 ha) COCA (1 ha). Half-Sib of BACOA (0.25 ha).

2.1.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 None during this period
	1.2 Training	1.1 None during this period
2. Extension	2.1 Workshops	2.1 Attended 2 PNVFA workshops in West Province.
	2.2 Publications	2.2 None completed
	2.3 Field days	2.3 None carried out.
3. Miscellaneous	3.1 Administration	3.1 A lot of time spent in imprest matters.
	3.2 Leave	3.2 One technician just got back from leave to help in harvesting.

2.1.5 OTHER ACCOMPLISHMENTS

The Unit has been also involved in PNVFA Extension work and promotion of new maize varieties, training on quality seed production methods, backstopping TLU Bambui for on-farm hybrid trials evaluation, evaluation of seed production cost for AID and PNVFA and drafting technical bulletins for KASAI-SR, ATP-SR, Coca-SR, Syn4-SR-Y, Syn 4-SR-W and EW-SR.

2.2 LOWLAND MAIZE BREEDING

2.2.1 INTRODUCTION

The Lowland Maize Breeding Unit covers all areas of Cameroon that are less than 1000 m in elevation. The goal of the unit is to provide farmers with acceptable, high yielding and stable varieties in three distinct target zones: lowland humid forest, lowland moist savanna, and sudan savanna. Breeding activities are concentrated in the forest zone covered by IRA's center at Nkolbisson, but a substantial number of trials are carried out in the moist and sudan savanna. Overall, trials are carried out in 16 locations. The unit's activities in Northern Cameroon are now being supported by Projet Garoua.

Through 1990, more than 10,000 new genotypes had been tested, of which 87 percent were created by the unit. The number of new introductions each year has now been reduced, and an effort is being made to create varieties which address specific purposes. Some of the main targets for the unit are acid tolerant soft endosperm varieties for the forest zone, striga tolerant varieties for the moist savanna zone, and drought tolerance for the sudan savanna. Inbred line development is continuing, and all inbred lines are being screened for tolerance to striga, drought and acid soil. Increased emphasis is now being given to production and maintenance of quality breeder and foundation seed.

2.2.2 SUMMARY OF ACTIVITIES

Testing of introduction included materials from SAFGRAD and IITA. The number of genotype introduced were reduced by over 70% due to budget constraints. However, the program developed more than 1500 new materials which are being evaluated for tolerance to major stresses i.e striga, drought, acid soils, streak virus borers tolerance and Turcicum resistance.

Under population improvement operation, all major varieties are undergoing Half-sib improvement scheme for yield and agronomic characteristics. In addition, the 3 heterotic pools are being improved by reciprocal Full-sib recurrent selection.

Inbred development is continued for identification of good combiners and new trait donor sources. Furthermore, the evaluation of combining ability of mid altitude lines with lowland inbred are yielding promising crosses for both areas.

Seed multiplication is being done on 11 ha. Varieties included are CMS 8501 (2 ha), CMS 8704 (4 ha), CMS 8806 (1 ha), CMS 9015 (0.5 ha) and others such as Ndock 8701, CMS 9213, Tzut-W and TZPB SR.

2.2.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Test introductions and develop material		
1.1 Identify and evaluate prospective varieties and hybrids.	1.1.1 National variety and hybrid trials (multiple sets).	1.1.1 National variety trial late and early conducted, respectively. - 8 National hybrid trial conducted. - 3 sets of on-farm trial at Nkollepe - 6 sets of commercial trial evaluated.
	1.1.2 White and yellow single crosses.	1.1.2. 4 single crosses white and 4 single yellow crosses conducted. - 3 sets of advanced singles crosses at 12 sites - 3 sets of advanced single crosses evaluated at 16 sites - 2 sets of advanced highland x lowland single crosses tested at 18 sets
	1.1.3 Experimental variety trial (multiple sets).	1.1.3. 12 experimental varieties trials made of composites conducted - 3 sets of R.U.V.T early and 3 sets of R.U.V.T extra early conducted

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 2: Population Improvement		
2.1 To improve plant and ear aspects, disease resistance, and stress tolerance.	2.1.1 Striga tolerant pool and population development.	2.1.1. About 100 inbred lines evaluated under Striga artificial infestation - 2 sets of striga single crosses screened under striga infestation - 30 new striga tolerant varieties investigated.
	2.1.2 Acid tolerant variety development.	2.1.2. 2 trials of acid tolerant tested in split plot at Nkoevone and Ebolowa - Acid tolerant inbred lines under selfing.
	2.1.3 Drought tolerant varieties development.	2.1.3. 2 sets of drought tolerant varieties tested at 3 sites each.
2.2 To develop new higher yielding and stable varieties.	2.2.1 Families testing and recombination.	2.2.1. 3 reciprocal full-sib families being evaluated. - 5 sets of TZB testcrosses and 7 sets of Suwan I testcrosses planted.
	2.2.2 S ₃ recombination and variety crosses.	2.2.2. About 10 new synthetics were made by variety crosses and are being evaluated at 7 locations.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 3: Inbred line and hybrid development		
3.1 Develop lines for creating hybrids and synthetics.	3.1.1 Inbred lines development.	3.1.1. 7 out of 18 populations advanced to higher generation.
	3.1.2 Testercrosses development.	3.1.2. Testercrosses formation on 3 populations
3.2 Develop hybrids which are better than synthetics.	3.2.1 Single and three-way crosses development.	3.2.1. 2 set of four ways crosses and 12 sets of three ways crosses evaluated at 2 sites each.
Operation 4: Seed maintenance and multiplication		
4.1 Maintain populations and lines.	4.1.1 Breeder seed maintenance.	4.1.1. Breeder of major varieties maintained including CMS 8501, CMS 8710, CMS 9213, CMS 8503, CMS 8507, Tzut-W
4.2 Produce seed for research and seed companies.	4.2.1 Seed multiplication of major varieties.	4.2.1. 4 ha of seed multiplication at Ntui for CMS 8704 and CMS 8501, CMS 8806 - 7 ha of seed multiplication of CMS 8704, CMS 8501, TZPB SR, Ndock 8701, CMS 8801, CMS 9015 in savanna zone.

2.2.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development.	1.1 Consultancies	1.1. None during this period
	1.2 Training	1.2. Mr Zonkeng to go to IITA for training in breeding for striga tolerance
2. Extension	2.1 Workshops	2.1. Dr. THE to attend workshop in Njombe on seed multiplication
	2.2 Publications	2.2. In progress.
	2.3 Field days	2.3. One field day organized by T.L.U Ekona. Visit made to breeding trials. More than 500 farmers or potential farmer advised on maize production.
3. Miscellaneous	3.1 Administration	3.1. Replacement of 4 casual workers.
	3.2 Leave	3.2. Short leave will be taken if work load permits.

2.2.5 OTHER ACTIVITIES

Other activities being carried by the program included the building of facility for cicadulina raising for streak resistant conversion of varieties. This activity is being financed by CORAF. Field activities include the on-farm variety trial being carried at 3 farmers field at Nkolfep. This is a new strategy for variety recommendation to the TLU. The program and IITA are cooperating for striga research. As such the unit conducted about 30 trials for IITA under artificial striga infestation.

3. RICE RESEARCH UNIT

3.1 RICE BREEDING AND AGRONOMY - NORTH

3.1.1 INTRODUCTION

The Rice Breeding and Agronomy Unit in Northern Cameroon is relatively new. It was created to intensify rice research in the North and Far North provinces, where Cameroon's rice production is centered. The unit is located at Garoua, where the national coordinator for rice research is based. One researcher is based at Maroua, focusing on activities at SEMRY.

The primary goal of the unit is to identify and select improved varieties for both irrigated and upland production systems. Heavy reliance is placed on introductions through international collaborative trials. The focus of agronomic research is practices for improving productivity while reducing cash costs. Projet Garoua is now contributing substantial financing for the research operations of this unit.

3.1.2 SUMMARY OF ACTIVITIES

The rice research units in Dschang, Garoua and Maroua accomplished over 80% of the approved activities in the 1993 plan of work. Two early duration varieties of rainfed rice ITA 257 and IRAT 112 were distributed to farmers around the south East Benoue and North East Benoue areas. Some varieties have also been extended to the Far North.

3.1.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Varietal Improvement		
1.1 Screen exotic germplasm for irrigated conditions.	1.1.1 Preliminary screening set (AIRPSS).	1.1.1 A total of 150 entries were planted
	1.1.2 Observation nursery (AIRON).	1.1.2 Plants are at maximum tillering stage.
	1.1.3 Advanced trial (AIRAT).	1.1.3 Accomplished.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1.2 Screen exotic germplasm for upland conditions.	1.2.1 Preliminary screening set (AURPSS).	1.2.1 Accomplished. 150 entries were planted.
	1.2.2 Observation nursery (AURON).	1.2.2 Most entries are booting.
	1.2.3 Advanced trial (AURAT).	1.2.3 Accomplished
1.3 Assess adaptation of elite material.	1.3.1 National coordinated trials.	1.3.1 A total of 10 entries were planted.
	1.3.2 Multilocation trial for SEMRY production units.	1.3.2 Selected elite materials were given to some farmers. Task was accomplished
1.4 Overcome deficiencies of lines or varieties, and select donors for line improvement.	1.4.1 Segregating population selection.	1.4.1 Initial selections based on plant phenotype have been made.
	1.4.2 Fixed lines	1.4.2 Accomplished
	1.4.3 Replicated yield trials.	1.4.3 Early maturing varieties are already booting.
	1.4.4 Hybridization.	1.4.4 Not accomplished.
Operation 2: Maintenance and seed multiplication		
2.1 Pure seed for on-farm trials and national programs.	2.1.1 Seed multiplication (Boklé and Lagdo).	2.1.1 Accomplished
	2.1.2 Seed multiplication (Yagoua and Maga).	2.1.2 Accomplished

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 3: Cultural practices and soil management		
3.1 Improve cultural practices for rice.	3.1.1 Transplanting dates for elite varieties.	3.1.1 Accomplished
3.2 Improve and sustain soil fertility in rice-based land use systems.	3.2.1 Management of rice straw.	3.2.1 Accomplished in Maga
	3.2.2 Soil nutrient analysis of rice-based land use systems.	3.2.2 Soil samples have been collected for analyses.
	3.2.3 Seeding rate for <i>Crotalaria</i> .	3.2.3 Seed multiplication of <i>Crotalaria</i> still continued.
	3.2.4 Improve P efficiency with organic matter.	3.2.4 Accomplished with some modifications.
Operation 4: Post harvest losses and transformation		
3.1. Reduce post harvest losses.	3.1.1 Method for field storing of unthreshed paddy.	3.1.1 Still to be performed on availability of funds.
3.2 Transformation of rice into consumable forms.	3.2.1 Processing broken rice into flour.	3.2.1 Still awaiting harvesting.

3.1.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 Consulted with soil Scientist at WARDA for collaborative work
	1.2 Training	1.2 Also met with the DTC of WARDA Training course will be organized in October 1993 in Garoua. Two staff of the rice unit went on short term training at Bouake, Ivory Coast.
2. Extension	2.1 Workshops	2.1 None
	2.2 Publications	2.2 None
	2.3 Field days	2.3 None
3. Miscellaneous	3.1 Administration	3.1 Imprest returns have continued as usual. In addition to managing the rice unit, the cereal agronomy section has been a pre occupation.
	3.2 Leave	3.2 Not gone on leave yet

3.1.5 OTHER ACCOMPLISHMENTS

The Rice research unit (North and Far-North) in addition to accomplishing most of the activities approved for funding in the 1993 plan of work, also distributed seeds of two varieties of rainfed rice to farmers around the Benoue division notably ITA 257 and IRAT 112. A total of about 1000 kg of seed material was distributed to farmers within the North East Benoue and South East Benoue for final selection of the better material by each farmer. It is worth noting that both varieties are performing well and preference of one variety over the other is difficult.

In Santchou, the rice breeder has accomplished most of the approved activities with lots of financial difficulties. Presumably rice pathology experiments were accomplished.

4. CEREALS AGRONOMY UNIT

4.1 INTRODUCTION

The Cereals Agronomy Unit conducts research on maize and sorghum agronomy in Adamamoua, North and Far North provinces. For research purposes, the area is divided into three main regions : highland plateau of Adamaoua, sub humid lowland savanna, and semi-arid lowland savanna. In these regions, the maize area under traditional and intensive cultivation is estimated to be around 70,000 hectares. The total area under sorghum production (rainy season and off-season) is about 430,000 hectares. Sorghum production is located mainly in the semi-arid lowland and sub-humid savanna.

The unit devotes 70 percent of its research effort to maize agronomy and 30 percent to sorghum agronomy. The emphasis on maize is because of its high potential, and the rapid increase in area planted to area during the last five years (partly as a result of introduction of better varieties and cultural practices). Maize will continue to increase in importance in the near future, particularly in the sub-humid lowland savanna and the highlands of Adamaoua.

4.2 SUMMARY OF ACTIVITIES

A total of five activities were performed in the cereal agronomy unit in Garoua. Four of these activities were on-station and one in farmers' fields. On the whole, the performance of all the trials has been good and observations are being recorded despite the tight financial situation.

4.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Agronomic practices for sustainable cereals systems		
1.1 Minimum tillage systems for sub-humid lowland savanna.	1.1.1 Interplanted fallow with maize and legume species.	1.1.1 Accomplished in 6 farmers' fields using 4 legume species.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1.2 Practices to improve soil productivity in sub-humid lowland savanna	1.2.1 Residual effects of soil improving legumes. 1.2.2 Effects of grain legumes on maize fertilization. 1.2.3 Effect of crop rotations on maize and sorghum.	1.2.1 Four soil improving legumes were used. 1.2.2 A total of 9 grain legumes were used for this trial. 1.2.3 Accomplished with slight modifications.

Operation 2: Practices to alleviate *Striga* Constraints

2.1 Evaluate the impact of trap crops.	2.1.1 Effect of trap crops on <i>Striga</i> on maize and sorghum.	2.1.1 Some legume crops (6) were used as trap crops for <i>Striga</i> .
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4. 3 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies 1.2 Training	1.1 None 1.2 None
2. Extension	2.1 Workshops 2.2 Publications 2.3 Field days	2.1 None 2.2 None 2.3 None
3. Miscellaneous	3.1 Administration 3.2 Leave.	3.1 Preparation of expense claims. 3.2 Mr. Youri went on annual leave from 24/03/93 to 24/04/93.

4.4 OTHER ACCOMPLISHMENTS

No other accomplishments.

5. SORGHUM RESEARCH UNIT

5.1 INTRODUCTION

Sorghum and pearl millet are the major cereals cultivated in North Cameroon. Sorghum is grown during the rainy season and post-rainy season. During the post-rainy season, a sorghum crop known as "muskwari" is started in nurseries, transplanted, and grown on residual soil moisture. Millet production has been decreasing sharply and now accounts for less than ten percent of area planted to sorghum and millet.

The goal of the Sorghum Research Unit is to increase sorghum and millet production through development of high yielding cultivars resistant to various pests and diseases. Efforts of the unit are split between a short-term strategy of germplasm introduction and screening, and a longer term strategy of crossing and screening segregating materials. The current emphasis is on: breeding sorghum for drought and striga tolerance, identifying sources of resistance by screening local as well as exotic germplasm, and identifying short cycle and non-photoperiod sensitive lines for pearl millet. The sorghum hybridization program has been considerably reduced but not terminated.

5.2 SUMMARY OF ACTIVITIES

A major accomplishment of our unit during the past cropping season has been the development of some new sorghum lines (SC 233, CS 141). Seed are now being multiplied for large scale testing. Our focus for 1993 remains variety improvement and screening material from local and international nurseries. During the first semester, the program was involved in the following activities.

Preparation of seed for various trials. An important quantity of seed was distributed to farmers who could not afford commercial seeds.

About 85% of the 1993 plan of work has been implemented in spite of erratic and poor rainfall distribution during the months of June and July. The major problem has been the general strike observed by IRA workers in June, that caused the delay in planting and suspension of some activities. The decision of NCRE not to pay for casual labour even though it was budgeted may adversely affect the program. It is highly suggested that casual labor be paid for approved operations.

Planting of sorghum and pearl millet trial started in mid July. Many crosses which are at present in F1, F2, F3, F4, and F5 generations were sowed. Six locations were used to test preliminary and advanced yield trials. Many international trials were planted. These included entomology trials and advanced elite lines.

The number of scientists working in the sorghum unit may decrease. Mr. Beyo Jacques, Ingenieur Agronome has been authorized to go to Nigeria for further training.

5.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Develop sorghum cultivars		
1.1 Improve local and exotic material by incorporating desirable traits.	1.1.1 Crossing development and testing.	1.1.1 Thirty five parents (local and improved) were sowed. Local will be purified and new crosses will be attempted. Thirty one F1, 11 F2, 118F3, 105 F4, 43 F5 (white color) 41F5 (Red color) 39 F6 were planted at Guiring.
1.2 Evaluate performance of introductions and selected genotypes.	1.2.1 Preliminary variety trials.	1.2.1 52 entries are being evaluated under different preliminary trial. These entries are planted in three locations having rainfall pattern.
	1.2.2 Multilocation variety adaptation trials.	1.2.2 Three sets of multilocation trials (16 entries each) are being evaluated in six locations. One set of local germplasm is planted in three locations.
	1.2.3 Collaborative testing program.	1.2.3 Eight international trials were planted. These included various nurseries of crop protection and elite lines. New breeding lines were received from international research centres.
1.3 Screen for resistance to <i>Striga hermontica</i> , and transfer resistance to elite material.	1.3.1 <i>Striga</i> observation nursery.	1.3.1 Fifty eight test entries (Lines and segregating progenies) are being evaluated in <i>striga</i> sick plot.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	1.3.2 National <i>striga</i> trial evaluation.	1.3.2 A trial of 21 entries is being carried out using the Checker Board layout in the <i>striga</i> sick plot.
	1.3.3 International, and West & Central Africa <i>striga</i> trials.	1.3.3 The trial has not been carried out in the sub region this cropping season. However, material regenerated for program were used in a different nursery.

Operation 2: Muskware germplasm collection, maintenance and evaluation

2.1 Classify muskwari collections by phenotype similarity, maturity and physiological response.	2.1.1 Muskware germplasm evaluation.	2.1.1 The Nursery of selected genotypes (119 entries) and 220 collected germplasm of Muskware is being established. The nucleous seed of promising early genotype (SAF 40) will be multiplied. The activities will start in September 1993.
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Operation 3: Develop pearl millet cultivars

3.1 Identify and develop suitable cultivars of different maturity cycles.	3.1.1 Screening trial for early and photoperiod insensitive material.	3.1.1 one hundred fifty five advanced lines and segregating material have been planted. Selection will be made for photoperiodism reaction, drought, ergot and smut tolerance.
3.2 Evaluate adaptability of promising selections.	3.2.1 Multilocation test for high and stable yield.	3.2.1 One set of trials (15 entries), have been planted in 4 locations. These are selected photoperiod insensitive early cultivars for late sowing.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 4: Nuclear seed multiplication		
4.1 Produce uniform and pure seed.	4.1.1 Seed multiplication of elite varieties.	4.1.1 Seed production of CS55, CS141, CS95, S35 is being carried out. Mass selection of some local varieties will be made.

5.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies 1.2 Training	The sorghum program has not received a consultant since the departure of the expatriate
2. Extension	2.1 Workshops	2.1 None during this period
	2.2 Publications	2.2 None during this period
	2.3 Field days	2.3 None during this period
3. Miscellaneous	3.1 Administration	3.1 Mr. Djonnewa André is the new NCRE Sorghum coordinator.
	3.2 Leave	3.2 April 28 to May 18, 1993 Djonnewa André, April 19 to May 20, 1993 Beyo Jacques, April 19 to May 20, 1993, Baïlangsou.

5.5 OTHER ACCOMPLISHMENTS

The Coordinator of West and Central African Millet Research Network will visit Cameroon in September 1993.

6. TESTING AND LIAISON UNIT

6.1 BAMBUI TLU

6.1.1 INTRODUCTION

The TLU at Bambui is responsible for farming systems research in the Western Highlands, with an emphasis on maize and rice-based cropping systems. The Western Highlands, comprising the North West (NWP) and West (WP) Provinces, cover less than 10 percent of the land area in Cameroon but contain 25 percent of the population, and produce over 60 percent of the national maize crop. The zone is mostly derived savannah, ranging in altitude from 400 to 3000 m, with annual rainfall between 1500 and 2500 mm.

The goal of Bambui TLU is to increase and stabilize the productivity of cereal-based farming systems in the NWP and WP, through the development, release and adoption by farmers of appropriate agronomic packages. Since 1982, progress has been made toward achieving this goal with the generation of farmer recommendations for maize and rice, built around new high yielding varieties, disease resistant, and with other characteristics desired by farmers (taste, storability, etc...). However, high crop:fallow ratios and farming of steeply sloping and marginal lands have caused considerable soil erosion losses and a general degradation of soil fertility. Negative effects on food crop yields cannot be offset only by use of improved varieties and chemical fertilizers. Taking this into account, the TLU carried out soil diagnostic studies and has initiated a set of multi-year soil conservation and fertility improvement trials.

In the past, the TLU Bambui has mostly focused on open-pollinated maize varieties. The reason given was that maize was a food crop and produced mainly by small scale farmers who can only afford low cost of production and management. But with the decrease of export crop prices, maize is becoming a cash crop and farmers are showing interest in investing in this crop production. For these reasons, the TLU Bambui involves itself in carrying out on-farm hybrid maize trials. Minikit trials and adoption plots help in reducing the time required to test and release new varieties.

The TLU is further trying to increase effectiveness by focusing its farmer surveys on assessing technology retention, diffusion and impact, rather than general systems description. The TLU Bambui is also trying to assess the metamorphosis in crop production pattern resulting from economic crisis. This will help in defining research priorities in the future.

The TLU Bambui is actively participating in the training activities of the National Training and Extension Project (NTEP) in the West Province. The TLU Bambui is playing a key role in assessing agroforestry areas in West Province where Peace Corps Volunteers will be posted.

6.1.2 SUMMARY OF ACTIVITIES

For the 1993 cropping season, the TLU activities comprised: soil erosion control and improvement trials, variety trials, surveys, and training. The soil erosion control and improvement included: soil fertility characterization, erosion control through agroforestry, improved fallow for soil fertility sustainability, soil phosphorus studies, and nitrogen top dressing. 90% of these activities have been completed. The variety trials focused on Hybrid maize stepwise trials, and maize and rice minikit trials. They are about to be completed. The surveys (impact survey and input-output monitoring to assess the effects of economic crisis) have to be started by September beginning. The training concerned the extension staff (monthly), and maize seed producers.

6.1.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1. Identify farmers' circumstances and practices		
1.1 Assess and quantify soil fertility in the Western Highlands.	1.1.1 North West Province soil fertility characterization.	1.1.1. Activity completed successfully. Completed soil map for the NWP now available. Draft of results for publication completed.
	1.1.2 Soil fertility attributes of Ankara system.	1.1.2. Soil analysis completed. Maize crop testing residual effects is due for harvest in August.
1.2 Identify factors affecting technology adoption and research impact.	1.2.1 Survey of maize farmers in West and North West.	1.2.1. Delayed because the budget was underestimated. A meeting will be held with Dr. Baker for adjustment. May start in September.
	1.2.2 Input-output monitoring to assess effects of economic crisis.	1.2.2. Collection of secondary data in progress. Will fully start in September.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 2. Identify improved and well adapted varieties		
2.1 Assess performance of new food crop varieties.	2.1.1 Hybrid maize stepwise trial.	2.1.1. Eight sites in the NWP and WP were established. Harvest begun by the end of July.
2.2 Confirm value and acceptability of IRA/NCRE cereal varieties.	2.2.1 Maize and rice minikits.	2.2.1. A total of 145 maize minikits were distributed to extension staff in January ending. One round visit has been made to assess problems and to measure the size of each plot. 25 rice minikits were distributed in Menchum Valley to test 3 varieties.
2.3 Increase access to improved varieties.	2.3.1 Backstopping of maize seed producers.	2.3.1. Some farmers followed seed multiplication technic especially in the WP.
Operation 3. Identify appropriate technologies for enhancing and sustaining soil fertility		
3.1 Evaluate the effect of improved soil conservation practices.	3.1.1 Erosion control through agroforestry (with Peace Corps).	3.1.1. The 7 last year sites have been maintained. Each PCV is handling at least 5 trials located in different villages in the NWP. Harvest has started.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
3.2 Evaluate the yield benefits from planted fallow.	3.2.1 Improved fallow for soil fertility sustainability.	<p>Suitable areas for PCV posting have been assessed by a TLU/PCV team in WP. A new shrub species (mulberry) has been introduced into the system. Two trials in Bambui and Babungo have been established to provide cuttings.</p> <p>3.2.1. Due to seed shortage, only 5 sites were established in the WP and NWP to produce seeds for a larger program in 1994. 4 species were tested.</p>
3.3 Determine fertilizer recommendations for specific recommendation domains.	3.3.1 Soil phosphorous studies.	3.3.1. Two trials have been established at Mfonta and Babungo. They will be harvested by August ending.
	3.3.2 Nitrogen top dressing trial.	3.3.2. A total of 46 sites were established on farmers' fields. Early drought and a lack of collaboration of certain VEWs in the NWP cause the loss of some trials.

6.1.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1. None.
	1.2 Training	1.2. Participation of TLU researchers as subject matter specialists in monthly training courses for AVV (Agents de Vulgarisation de Village - VEVs) in the WP (about 150 AVV per course). 3 TLU researchers and 1 technician attended the computer training courses organized by the IRA/IRZ Biometrics service.
2. Extension	2.1 Workshops	2.1. Samatana, Enam and Meppe attended the Resource Management Survey workshops in Yaoundé. Meppe represented the TLU Bambui at the NETP meeting in Maroua. Samatana participated in the impact evaluation workshop in the NWP.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	2.2 Publications	2.2. Paper entitled "Effect of liming amendment on maize as influenced by its source and rate of application" to be presented at the ASA meeting in November. Leaflets on soil characterization vs maize varieties to be released by the end of the cropping season.
	2.3 Field days	2.3. Not yet organized.
3. Miscellaneous	3.1 Administration	3.1. no special activity
	3.2 Leave	3.2. Samatana would go on leave by mid-August.

6.1.5 OTHER ACCOMPLISHMENTS

Supervision of students from Agric-School

FOLLOW-UP ACTIVITIES

Harvest of on-farm trials will continue. Most of the rest of the year will be reserved for surveys, data tabulation, analysis, interpretation and report writing. Meppe may participate in ASA workshop.

6.2 EKONA TLU

6.2.1 INTRODUCTION

Ekona TLU is responsible for the Coastal Humid Forest Region of Cameroon. The TLU works to improve food crop production of smallholders in South West and Littoral provinces through diagnosis of agricultural constraints and opportunities, testing of improved varieties and agronomic cultural practices, and informational liaison between the extension service and IRA.

Since its creation in 1986, TLU work at Ekona has focussed on (a) provision of baseline data on smallholder agriculture, (b) on-farm testing of NCRE maize and IRA/IITA cassava varieties, (c) soil and weed management trials on-station and (d) post-harvest problems of maize (storage) and other food crops (marketing). Liaison with extension has been effected through annual training and planning workshops, collaborative research and minikit distributions. The basic approach of the TLU; involving a combination of on-station trials, researcher and farmer managed trial in focus villages, and minikit distributions is continuing. However, increased emphasis is now being given to biological technologies for enhancing and sustaining farm systems productivity.

6.2.2 SUMMARY OF ACTIVITIES

By mid year TLU Ekona had established all trials approved for 1993 except the regional maize variety test. Focus village meetings were held at 7 villages in the South West Province. Maize minikits were distributed for the first time in Littoral Province. The four year alley system and the cover crop trials were concluded and on-farm data from the Component Technology showed the dominating effect of cassava on total yield, caloric monetary and protein, returns.

By mid year TLU Ekona had established all trials and initiated the specific diagnostic surveys approved for 1993 except the Regional Maize variety test. Focus village meetings were held at 7 villages in South West Province. The demonstration and cassava multiplication plots, added to the workplan, have been established and a field day is planned July 16, 1993.

TLU Ekona staff served as resource personnel in the National Agricultural Extension and Training (NAET) and global 2000 workshops. The computer training and weekly work schedule meetings were suspended due to the continuous strike by IRA staff. The terminal report of the departing Technical Assistant was prepared.

6.2.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Diagnosis of farmers' circumstances and practices		
1.1 Evaluate farmers' decisions and constraints with respect to new technologies.	1.1.1 Determine land use and opportunities for agroforestry.	1.1.1 Survey carried out in 7 Peace Corp villages and covered 7 areas of sustainability. A total of 244 farmers (36 women) participated.
	1.1.2 Focus village meetings	1.1.2 Meetings held in 5 villages with 195 participants (64 women)
1.2 Feedback information on farming systems and markets.	1.2.1 Price data from local markets.	Activity terminated Dec. 1992. Allocations were to pay-off monitors.
Operation 2: Identify biological technologies for improving soil fertility and weed control		
2.1. Assess use of spreading crops and herbaceous legumes.	2.1.1 Spreading plants for weed control and soil fertility improvement.	2.1.1 Best weed control was from the one year fallow of crotolaria, Mimosa and Pueraria. Follow up maize yield as index of improved soil fertility was in the order <i>Mimosa</i> > <i>Crotolaria</i> > <i>Pueraria</i> .
	2.2.1 Introduce agroforestry systems, with Peace Corps.	2.2.1 Out of 7 focus villages, peace corps have been placed in 4, working on agroforestry extension.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
		At least two alley nurseries and demonstration farms have been established on-farm. In each village, farmers interested in alley are gradually increasing.
	2.2.2 Maintain alley systems at high visibility sites.	2.2.2 Two permanent alley sites have been established at Ekona station and mile 17 along the main roads to serve mostly as demonstrations of effect of residual N from alley legumes on maize yields.
	2.2.3 Effects of Leucaena and Gliricidia on crop yield.	2.2.3 After 4 continuous years of cropping with maize, this trial has shown high stability of the legume alley crops over fertilized and non-fertilized. The 5th year trial, though well established, was destroyed by rodents and birds.

Operation 3: Identify improved and well-adapted crop varieties

3.1 Identify varieties and other components for improved packages.	3.1.1 Cassava variety evaluation.	3.1.1 14 poundable clones were introduced from IITA by second season 1992. These are still growing in the field and will be evaluated at harvest.
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OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	3.1.2 Finish components trial from 1992.	3.1.2 The components that contributed highest to total yield, income energy and protein are those with improved crop varieties (cassava and maize) followed by fertilizer. Weeding effects were unclear.
3.2 Farm level variety testing.	3.2.1 Minikit evaluation for maize and cassava.	3.2.1 90 minikits of CMS 8501, 8704, and 8806 were sent to the Littoral province. These varieties were already established in South West.
	3.2.2 Regional test of selected maize varieties.	3.2.2 Not carried out due to non-timely availability of materials desired.
	3.2.3 Evaluation of ROTREP cocoyam selections.	3.2.3 Because of lack of planting material only 4 farmers fields were established with 2 improved cocoyam selections. Harvesting is still awaited.
Operation 4: Disseminate and monitor technologies		
4.1 Increase access to new varieties.	4.1.1 Multiple seed with contract farmers.	4.1.1 Two hectares of cassava were planted on a farmer's field on contract. The plan is to distribute the planting materials realized to 100 farmers interested in stake production for marketing.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
4.2 Determine adoption and impact of improved varieties.	4.2.1 Retention survey for sweet potatoes.	4.2.1 Pre survey done in July. List drawn from 31 out of 37 villages. Sample frame developed for formal survey.

6.2.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies 1.2 Training	1.1 Not yet started. (Planned for Oct./Nov. 93).
2. Extension	2.1 Workshops 2.2 Publications 2.3 Field days	2.1 Resource Persons in NAETP and NGCs. 2.2 Several 2.3 Planned for second half July 16.
3. Miscellaneous	3.1 Administration 3.2 Leave	3.1 None 3.2 None

6.2.5 OTHER ACTIVITIES

TLU is now a regular resource source for the NAETP Agricultural monthly training workshops in food crops production systems and marketing. Invitation to participate in GLOBAL 2000 workshop was honored.

6.3 MAROUA TLU

6.3.1 INTRODUCTION

The global objective of Maroua TLU remains to contribute to the development, evaluation and dissemination of technologies in order to: (a) increase, stabilize and diversify food crop production; (b) maintain soil productivity; and (c) increase farmers' income. The mandate zone remains the Far North Province and the northern part of the North Province.

After detailed review of our three stage on-farm testing approach (research villages, regional trials, and minikits), we have decided to focus on research village trials and minikits. In an effort to encourage farmer participation, frequent discussions are held with farmers in the research villages. Technologies are tested in response to major constraints mentioned by farmers, and thematic discussion groups are formed around solutions being tested. Our minikit activity is a means of extending a technology while still gathering valuable data on farmer acceptance. Promising technologies are also being passed to the National Training and Extension Program (PNVFA) of MINAGRI. Expensive regional testing has been eliminated with all technologies either advancing toward extension to farmers or being given back to IRA researchers for adaptation. On-station technology development has been reduced to the minimum needed to backstop the work on soil-rehabilitation and maintenance with cover crops.

6.3.2 SUMMARY OF ACTIVITIES

After departure of Dr. Carsky, Mr. Ndikawa replaced him as Systems Agronomist (on-station) and TLU counterpart for on-farm tests emphasizing on cover crops and other agroforestry technologies. Implementation of all on-farm tests planned for 1993 was well organized despite the difficulties encountered with millet variety Gouzouma (too early maturation)

Rainfall was erratic in June and early July which affected sorghum/cowpea association tests (cowpea Vya overshadowed by sorghum) at all sites. However, discussions with farmers in their fields and with PNVFA agents have reinforced research-extension-farmer linkages much better than last year. TLU Maroua also backstopped the Cereals Agronomy program in Garoua. Dr. Kamuanga was appointed TLU coordinator in replacement of Dr. Moussie who left NCRE.

6.3.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Improve knowledge of farmers' circumstances, practices and institutional framework		
1.1 Identify farmers' constraints and strategies to better choose research themes.	1.1.1 Village-level discussion groups.	1.1.1 Discussion groups formed. First round of meetings held in all 3 villages; more than 200 farmers contacted.
Operation 2: Generate technology to stabilize yields of sorghum		
2.1 Identify practices to reduce striga and other pest populations in sorghum and legumes.	2.1.2 Foliar insecticide on sorghum.	2.1.2 Follow up of 17 tests in progress, 2 tests eliminated for poor implementation of protocol. Early feedback from farmers is encouraging. No attack by Spodoptera signaled.
2.2 Identify viable practices to conserve soil moisture and fertility in rainfed sorghum.	2.2.1 Observation on hedgerows and crops.	2.2.1 Satisfactory regrowth of trees after pruning; associated cotton with good establishment; moisture measurement in progress.
	2.2.2 Cover crop screening	2.2.2 Good plant establishment for cover crops trials; 60-100% ground-cover to-date at Guetale and Mouda.
Operation 3: Identify improved varieties, cropping patterns and soil moisture conservation techniques		
3.1 Assess new sorghum, millet, cowpea, and peanut varieties.	3.1.1 Test of early peanut variety and phosphate.	3.1.1 21 tests with varieties K32, 55-437 and locals in progress. Good establishment for K32 in Djoulgouf. Early feedback from farmers is favorable. 2 tests abandoned.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	3.1.2 Millet variety test.	3.1.2 thirty two tests established; grain mould noted on Gouzouma; IKMV8201 shows good establishment. 5 tests abandoned in Djingliya and Zouaye.
3.2 Assess sorghum/cowpea intercroppings.	3.2.1 Sorghum/cowpea association to combat Striga.	3.2.1 Forty two tests planted; irregular ground cover with Vya due to erratic rains at Zouaye, Djoulgouf.
3.3 Assess land preparation techniques, cropping systems and cover crops for conserving soil fertility and moisture.	3.3.1 Pigeon pea association with cereals.	3.3.1 Four of the 14 tests at Djingliya abandoned, establishment is good and feedback variable.
	3.3.2 Monitor PNVFA pigeon pea plots.	3.3.2 Inventory of all participating farmers in progress. Questionnaire designed.
	3.3.3 Mucuna for soil regeneration.	3.3.3 At Djoulgouf and Zouaye, poor ground cover noted due to insufficient rains.

Operation 4: Identify low cost, practicable post harvest technologies for reducing grain losses

4.1 Determine and assess profitability of improved storage techniques.	4.1.1 Finalize 1992 cowpea storage regional test.	4.1.1 Eighty five percent of respondents participated. Data being cleaned and processing to begin in September. Overall acceptance of technologies by farmers judged very high.
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OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 5: Disseminate and monitor technologies		
5.1 Evaluate farmer acceptance and impact of technologies.	5.1.1 Minikits for maize, peanuts and seed treatment.	5.1.1 One hundred eighty two tests of maize (8704), 75 tests of maize (8501) and 90 tests of peanuts (K32; M416) distributed with PNVFA agents.
	5.1.2 Retention surveys of TLU disseminated technologies.	5.1.2 Sampling frame under preparation.
	5.1.3 SODECOTON reimbursement for 1992 regional testing.	5.1.3 Effected.

6.3.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 Dr. Spencer (IITA) in June.
	1.2 Training	1.2 6 PNVFA subject matter specialists received 2 sessions on weeds control.
	1.3 Backstop Cereals Agronomy Garoua*	1.3 Mission effected July 12-13, report available.
2. Extension	2.1 Workshops	2.1 Counterparts attended workshop at Umudike, Nigeria (IITA/COMBS) and on SYSTAT in Garoua.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
2.2 Publications	2.2. In progress. 2.3 Field days	2.3 Planned for September.
3. Miscellaneous	3.1 Administration	Adm Clerk to leave next September.
	3.2 Leave	Counterpart agronomist took leave.

6.3.5 OTHER ACCOMPLISHMENTS

TLU Maroua embarked on a new approach emphasizing farmers' participation in research process and a more effective two-pronged dialogue with thematic researchers and PNVFA subject matter specialists. Discussion groups in the 3 villages are helping both TLU scientists and PNVFA collaborators to focus on themes felt relevant by farmers. Joint field visits to TLU sites and PNVFA centers are being organized with part of the funding supported by PNVFA budget at IRA/Maroua.

Discussions are underway between TLU/Maroua and IRA/CRSP project for setting up of a clearing house mechanism to promote market information and commercialization of cowpea in the Far North Province. Activities are expected to begin in September or October.

6.4 NKOI.BISSON TLU

6.4.1 INTRODUCTION

Nkolbisson TLU is responsible for the Sub-Humid Forest zone of southern Cameroon. Research is carried out in Center and South provinces, where the TLU has four types of activities: farming systems surveys, on-station trials, research village testing, and regional testing. Farming systems surveys are used to measure impact of improved maize varieties at the village level, and to construct crop enterprise budgets. The TLU uses on-station research for technology development and technical assessment, while best bet options are tested with farmers on their fields in order to evaluate adaptability and acceptability. The regional testing and demonstration program is carried out in collaboration with the Ministry of Agriculture. Through this activity, hundreds of extension agents and thousands of farmers are being exposed to IRA maize, cassava and sweet potato varieties, as well as other tentative TLU recommendations.

The TLU's operations remain unchanged from the four-year work plan. Among operations, primary emphasis is given to: (a) identifying appropriate practices for enhancing and sustaining soil fertility, and (b) increasing farmers' knowledge about IRA varieties and technologies. Relatively minor investments are being made in screening additional new varieties. Generating information on farmer circumstances is a middle level priority.

6.4.2 SUMMARY OF ACTIVITIES

In 1993, the TLU's on-farm research is located in the six research villages, including two from the South Province. Four new research activities have been carried out in 1993:

- 1) Diagnostic survey in the 2 villages and the South Province.
- 2) Village/farmer meetings in each of the six TLU villages.
- 3) Seed multiplication (by farmer groups) in all the six villages.
- 4) Demonstration plots/field days in all the six villages.

In 1993, the TLU reduced the number of villages and farmers for the regional tests and adoption plots by 40%. This was done to improve the effectiveness of the program through regular follow up and supervision by TLU researchers/technicians.

6.4.4 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Farming systems diagnosis		
1.1 Provide information and identify research needs.	1.1.1 Farm input-output study.	1.1.1 In the planning stage. Expected to start 2nd season.
	1.1.2 Rapid appraisal in South Province research villages.	1.1.2 Survey done in 2 villages. Report written and submitted to COP.
	1.1.3 Village meetings.	1.1.3 Village meetings held in the six TLU research villages. An average of 40 farm households/village participated in the TLU-Farmer meetings.
Operation 2: On-farm technology evaluation		
2.1 Identify well-adapted and acceptable varieties.	2.1.1 Research village maize variety tests.	2.1.1 This trial implemented in the six villages 15 farmers per village for CMS 9015, BSR Sinc-1 and local.
	2.2.2 Regional variety testing program.	2.1.2 Maize and cassava improved varieties being tested in 15 villages - 120 farmers.
Operation 3: Technologies for sustainable soil improvement		
3.1 Evaluate benefits from leguminous hedgerows.	3.1.1 On-farm test of Calliandra hedgerows.	3.1.1 Trial on its second year in 2 villages of the Center Province (Nkollep and Kiki). Initial results show promising outcome.
	3.1.2 Cassia hedgerows with different fallow management.	3.1.2 Trial to be ended this season after 3 years of consistent results.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
3.2. Identify species and practices for legume fallow.	3.2.1 <i>Sesbania</i> and <i>Mimosa</i> fallow management.	3.2.1 Trial implemented on-station. Trial to end this year after positive results. Both species appear to be improving soil fertility and controlling weeds.
	3.3.2 On-farm test of <i>Crotalaria</i> and <i>Desmodium</i> .	3.2.2 planned for second season.

Operation 4: Disseminate and monitor technologies

4.1 Increase access to new varieties.	4.1.1 Regional adoption plots.	4.1.1. Material (CMS 8704, CMS 8501) distributed to 250 farm households in 25 villages.
	4.1.2 Seed multiplication and demonstration in research villages.	4.1.2 Seed multiplication and demonstration in research village. 4.1.2 Improved maize multiplied by farmers for seed in six villages. Five maize varieties evaluated in six demonstration plots. Two field days organised at Bikok and Ndjazeng with the participation of 95 farmers.

6.4.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	None during this Period
	1.2 Training	-"-
	1.3 TLU Coordination	-"-
2. Extension	2.1 Workshops	-"-
	2.2 Publications	-"-
	2.3 Field days	-"-
3. Miscellaneous	3.1 Administration	-"-
	3.2 Leave	-"-

7. ECONOMIC ANALYSIS UNIT

7.1 INTRODUCTION

The function of the Economic Analysis Unit is to provide IRA with a capacity for economic analysis relative to its research and development mandate. Project support is being given for establishment and operation of an Economic Analysis Unit in recognition of the challenges being faced by IRA as a result of Cameroon's on-going economic crisis and structural adjustment.

The goal of the Economic Analysis Unit is to increase IRA's research efficiency, productivity and impact. The top priority of the unit is carrying out economic studies for institute-level priority setting and programming and for measuring research benefits. To complement its own studies, the unit assists IRA researchers through research collaboration, advisory services and training.

7.2 SUMMARY OF ACTIVITIES

The first two months were spent coordinating work plan review. Research programming sheets developed for IRA were pre-tested with project research units, and detailed comments were given to each unit on proposed activities and budgets. Aside from one week in Ibadan, March was devoted to data analysis and drafting working papers related to MASAR (management system for agricultural research). The main activity in April was organizing two workshops: one on research evaluation, the other on findings from the 1992 resource management survey.

In May and June, the Unit worked on restructuring and priority setting activities. Comments on the FAO proposal were prepared for IRA's Director and USAID. A paper was written on budget allocation and priority setting. This was given during participation in a National Extension Project (NAETP) workshop in Maroua. A researcher audit survey was developed and sent out in order to assess research supply, while a farmer priority setting survey was designed to determine demand for research. Research activity sheets, based on those pre-tested with the NCRE, were prepared for the NAETP.

7.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Analyze economics of IRA research		
1.1 Evaluate policy-technology-development linkages.	1.1.1 IRA and economic crisis study.	1.1.1 Suspended due to FAO restructuring plan.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	1.1.2 Research zone differentiation.	1.1.2 Multivariate data analysis of 1992 resource management survey. Workshop held on results.
1.2 Appraise research costs and benefits.	1.2.1 Cameroon maize production study. 1.2.2 TLU evaluation study. 1.2.3 Research evaluation workshop.	1.2.1 Suspended due to overlap with CAPP study. 1.2.2 Materials collected from Maroua & Bambui. 1.2.3 Workshop held; report distributed.
Operation 2: Economic analysis support services		
2.1 Support IRA Research Services.	2.1.1 Management System for Agricultural Research. 2.1.2 Research priorities and objectives.	2.1.1 Programming sheets pre-tested with NCRE; modified for NAEFP. Progress on four working papers. 2.1.2 Paper written on IRA/IRZV priority setting. Researcher audit and farmer priority surveys started.
2.2 Help IRA and HTA researchers.	2.2.1 Economics Unit advisory service. 2.2.2 Design and organize TLU input-output monitoring and impact survey.	2.2.1 Detailed review of NCRE research proposals. Advice given on several studies. 2.2.2 Designed approach for TLU in-out study. Impact survey cancelled.
Institutional Development and Extension		
1. Institutional development	1.1 Consultancies. 1.2 Training.	1.1 None proposed. 1.2 None proposed.
2. Extension	2.1 Workshops. 2.2 Publications. 2.3 Field days.	2.1 None proposed. 2.2 Progress on several; none completed. 2.3 None proposed.

7.4 OTHER ACTIVITIES

In a project implementation committee meeting, the Economic Analysis Unit was assigned the following additional responsibilities:

- a) Organize cross site studies and workshops for priority setting and impact assessment
- a) Coordinate research system restructuring
- b) Organize research programming (Cereals and Farming Systems Programs)
- c) Coordinate seed policy development
- d) Develop a strategy for commercialization

In recognition of these new responsibilities, the 1993 work plan of the Unit has been modified as shown below.

- a) Research Operations

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Economics of IRA research		
1.1 Determine research priorities	1.1.1 Synthesis of IRA/IRZV zonal level priority setting	4
	1.1.2 Farmer priority setting survey	4
	1.1.3 Researcher audit survey	4
1.2 Appraise research costs and benefits	1.2.1 TLU evaluation study	10
	1.2.2 Research evaluation workshop	3
Operation 2: Sub-sector studies		
2.1 Evaluate resource use and productivity.	2.1.1 Research zone differentiation	10
	2.1.2 TLU input-output monitoring	4
	2.1.3 Cameroon maize production study (design)	2
2.2 Assess support systems and sectoral linkages.	2.2.1 Commercialization strategy paper.	6
	2.2.2 Marketing systems rapid appraisal survey (design).	2

b) Other Activities

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	0
	1.2 Training	0
2. Extension	2.1 Workshops	0
	2.2 Publications	6
	2.3 Field days	0
3. Miscellaneous	3.1 Administration	4
	3.2 Leave	12
4. Economics Unit support services	4.1 Farming Systems Program (FSP) Planning Commission	4
	4.2 Research restructuring	3
	4.3 Research programming (Cereals and Farming Systems)	14
	4.4 Seed policy development	4
	4.5 Management System for Agricultural Research (MASAR)	4

Corresponding to the revised work plan, a seed policy initiative was developed and proposed for consideration by USAID and Ministry of Agriculture. A visit was made to Michigan State University (during home leave) in order to collect materials and information for design of a commercialization strategy. The FSP Planning Commission held an organizational meeting to develop a schedule and budget. The Economics Analysis Unit will co-ordinate the commission and serve as the commission's secretariat.

8. SOIL/AGROFORESTRY UNIT

8.1 INTRODUCTION

The purpose of this unit is to evaluate use of agroforestry and improved fallow techniques for conserving soil fertility and sustaining crop production in the Western Highlands. The top priority of the unit is evaluation of leguminous species. Selected woody leguminous species are being evaluated for soil fertility management and erosion control in agroforestry systems. Herbaceous legumes are being evaluated as sources of nitrogen in improved fallow systems. Most research is carried out on-station or at Training and Development Centers (TDCs) in a wide range of sites. On-farm activities are carried out in close collaboration with the Bambui TLU.

8.2 SUMMARY OF ACTIVITIES

Major activities of the unit can be summarized as follows:

Preparation of planting materials and layout of trial plots in our various research sites (Mfonta, Babungo, Betang, F'oumbot, TDC's at Nkwen, Mbiyeh) and participation in the first coordination meeting of IRA research center for the Western Cameroon Highlands, held in Bafoussam.

In addition to our established research activities, the outreach activities of the unit were increased during this period. This was accomplished by:

1. Setting out more on-farm trials for testing the adaptability of promising improved fallow species identified in previous years. A total of 11 trials were laid out on farmers' fields, MIDENO trial and demonstration centers and research stations.
2. Supporting PCV's agroforestry work through SCICC meetings, supply of seeds/seedlings of leguminous shrubs and providing polythene bags for nurseries.
3. Participation in the training of "Techniciens Spécialisés" during the monthly workshops organized by the provincial delegation of agriculture for the West Province in the framework of the National Program for Agricultural Extension and Training (PNVFA).
4. Organizing a field day for farm group leaders from the Northwest and Southwest Provinces to expose them to our research findings on the improvement of production on a sustainable basis on the best lands and on the sustaining of productivity of problem soils.
5. Holding preparatory meetings with NGOs engaged in agroforestry and related soil fertility conservation work for future collaborative work (the case of HPI-Cameroon).

8.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Shrub evaluation		
1.1 Evaluation and management of woody leguminous species for soil fertility improvement and erosion control.	1.1.1 Alley cropping for soil fertility management.	1.1.1 Trials were planted with maize. There was close follow up and crop is still awaiting harvesting.
	1.1.2 Comparison of simultaneous fallow with <i>Calliandra</i> and <i>Tephrosia</i> .	1.1.2 The long term soil fertility management potential of <i>Calliandra</i> was confirmed though there will be need for additional fertilization for sustainability.
	1.1.3 Agroforestry for soil conservation: prototype trials.	1.1.3 Trials installed last year continue to be monitored, although a few were destroyed during last dry season by stray animals.
	1.1.4 Stimulation of <i>Leucaena</i> growth with manure.	1.1.4 Intensive data collection stopped at beginning of year trial plots have continued to be maintained for observation of coppicing ability of the plants.
Operation 2: Evaluation of herbaceous legumes		
2.1 Evaluation of herbaceous legumes for use as N sources in improved fallow systems.	2.2.1 Screening of indigenous species for soil management.	2.2.1 Trials established last year were replanted with maize to observe residual effect of legume biomass on yields.
	2.1.2 Management options for <i>Tephrosia</i> and <i>Crotalaria</i> fallows.	2.1.2 Trials maintained at three of the sites; maize and beans were planted. Results will determine whether last year's trend continue.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	2.1.3 Evaluate green manuring on-farm.	2.1.3 A total of 11 trials were laid out across locations in the Western Highlands with leguminous species; trends in species vs environment interaction were confirmed. Biomass to be incorporated and second season crop planted.
	2.1.4 Crop response to P under improved fallow management.	2.1.4 Trial was replanted with maize and beans. <i>Mucuna</i> superiority seemed to be confirmed.
	2.1.5 Short and long term fallow with <i>Cajanus</i> .	2.1.5 Trial was replanted with maize and beans. Last year's trend confirmed with 6 months fallow seemingly better; analysis of results will confirm observations.

8.3 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies. 1.2 Training.	1.1 See visitors list below 1.2 None during this period
2. Extension	2.1 Workshops. 2.2 Publications.	2.1 A computer literacy and Statistical analysis workshop was organized at the station 2.2 One scientific paper submitted for publication in the series of NCRE pamphlets and technical bulletins.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	2.3 Field days.	2.3 PCV's came for an Agroforestry field visit at TDC Nkwen, and IRA trial sites at Mfonta and Babungo.
3. Miscellaneous	3.1 Administration.	3.1 Dr Yamoah, Unit Head, discharged all his duties as new on-site coordinator for NCRE.
	3.2 Leave.	3.2 Dr Yamoah went on home leave and is to be back on the 06/09/93.

8.4 OTHER ACCOMPLISHMENTS

A conference was given at IRA Bambui, on June 4th, 1993 on the theme "Agroforestry for soil conservation" by Messrs M. Ngueguim and C. Ngong. Participants included researchers of other units, and from other research stations and centers (IRZV, CRA Founbot) and organizations (RCA Bambili, RTC Mfonta, etc.).

9. GRAIN LEGUME RESEARCH UNIT

9.1 INTRODUCTION

Grain legumes, particularly Cowpea, are important crops in Northern Cameroon. They are grown by small farmers, mostly in intercropping with cereals. Cowpea is a cheap source of protein and is consumed in various ways (dry seed, green leaves, green pod) for human consumption and fodder for animal feed.

During the early stages of Cowpea research in Cameroon, emphasis was put on pest management. Yield losses have been established, effective storage methods recommended, and varieties resistant to storage insect pests developed. The current approach of the Grain Legume Unit is to develop a broad base system of research on Cowpea, with minor activity on other legumes. In addition to breeding for storage insect pest resistance, emphasis is being given to other aspects such as: diseases (virus), the parasitic weed *Striga*, dual purpose utilization (grain and fodder), seed quality (color, size), and field insect pests.

9.2 SUMMARY OF ACTIVITIES

During this period the activities could be summarized as follow:

The Grain Legume team participated in the IRA-NORTH 1993 technical meeting and computer workshop at Garoua.

The Grain legumes specialist Dr Jean DETONGNON left the Grain Legume to his home country. With his departure the unit is facing a vehicle problem. His vehicle has been taken from the Unit. With only one vehicle it is very difficult to have the work well done on time in the 2 provinces (North and Far North) we cover. Mr Chevalier ENDONDO (Grain legumes Agronomist) and Ousmane BOUKAR (cowpea breeder) visited IITA/KANO to finalize and collect collaborative trials and inputs. The preparation of planting material and layout of the experiment field at Guiring, Guetalé and Sanguéré has been done. The trials have been planted.

9.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Identify high yielding and adapted varieties		
1.1 Identification of good performing cowpea varieties.	1.1.1 Early maturity trial 1.1.2 Photosensitive early trial. 1.1.3 Erect early trial. 1.1.4 Seed maturity trial. 1.1.5 Dual purpose trial. 1.1.6 Indicator trial. 1.1.7 Regional trial.	1.1.1 to 1.1.7 All cowpea varietal trials (8) received from IITA and regional trial (3) have been planted at Guiring, Guetale and Sanguere, from July 14 to July 23, 1993.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1.2 Identification of good performing soybean varieties.	1.2.1 Varietal trial.	1.2.2 We did not receive a new soybean varietal trial, the best lines from 1992 varietal trial have been planted on July 22, for second evaluation.
Operation 2: Evaluation of germplasm and varietal development		
2.1 Maintain a working collection for selection of parents or hybridization.	2.1.1 Cowpea germplasm evaluation.	2.1.1 72 lines from the 1992 evaluation test have been planted at Guiring.
2.2 Develop new varieties.	2.2.1 Evaluation of advanced generations.	2.2.1 F2 and F3 population from different crosses have been planted at Guiring.
Operation 3: Evaluation of cowpea lines under different cropping systems		
3.1 Identification of good genotypes for different management systems.	3.1.1 Insecticide application trial.	3.1.1 The trial has been planted at Guiring: one variety BRI under 3 levels of insecticide
	3.1.2 Cowpea date of planting trial.	3.1.2 We did not plant this trial. With one vehicle it was not possible to plant in different sites in the same date.
	3.1.3 Dual purpose cowpea for sorghum system.	3.1.3 The trial has been planted at Guiring and Sanguaré.
Operation 4: Evaluation of cowpea lines for resistance to Striga and virus.		
4.1 Identify of resistance under natural infestation.	4.1.1 Cowpea Striga resistance trial.	4.1.1 A trial of 20 lines of cowpea has been planted on our striga plot at Guiring.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
	4.1.2 Cowpea virus resistance trial.	4.1.2 20 lines have been planted at Guiring.

Operation 5: Varietal purification and seed multiplication

5.1 Purify and multiply released varieties.	5.1.1 Seed multiplication and varietal purification.	5.1.1 BR1, VYA, and one new high yielding and adapted variety (IT88DM-363) have been multiplied at Guiring and Sanguere.
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9.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.2 None
	1.2 Training	1.2 None
2. Extension	2.1 Workshops	2.1 Mr Chevalier ENDONDO and Mr Ousmane BOUKAR participated in the computer workshop at Garoua.
	2.2 Publications	2.2 None
	2.3 Field days	2.2 None
3. Miscellaneous	3.1 Administration	3.1 None
	3.2 Leave	3.2 None

10. PLANT PROTECTION UNIT

10.1 PLANT PATHOLOGY

10.1.1 INTRODUCTION

The Plant Pathology Unit, located at Bambui, has responsibilities for identifying cereal diseases in their growing zones and assessing the importance of these diseases. The goal of the unit is to enhance production of maize, sorghum, and millet in Cameroon by reducing yield losses due to diseases through identification of resistant or tolerant genotypes, and appropriate cultural practices. The unit collaborates closely with the maize, sorghum and millet improvement teams in order to screen and identify resistant varieties. While the unit is based at Bambui, it covers all agroecological zones since it is IRA's only cereal pathology unit. NCRE Project support is provided for activities in the Western Highlands. Activities on sorghum and millet were canceled in 1992.

10.1.2 SUMMARY OF ACTIVITIES

During the first semester of 1993, the unit planted all the scheduled trials in 6 locations of West and North-West Provinces. A week after planting, trials in Mbiyeh were destroyed by drought. Trials planted in Santa were damaged by birds ten days after germination. In both locations, trials were replanted, but they were destroyed by heavy hail. They then performed so poorly that we decided to cancel that location.

Trials in 5 locations were artificially inoculated with spore suspension of *Puccinia polysora* and *Exerohilium turcicum*. Ground infected leaves were used for *Phaeosphaeria* leaf spot. The inoculations were successful. Disease incidence and severity were recorded weekly by location starting fifteen days after inoculation until physiological maturity. Other diseases present in the fields were recorded. Breeders' materials were evaluated in South-west, Centre, South, West and North-West provinces at their request. TLB's trials were also evaluated in West and North-West provinces.

In the lowland areas, *Puccinia polysora* and *Bipolaris maydis* were prevalent. *Exerohilium turcicum* was also recorded in that area. The severity of *Ustilago maydis* was very high (~80%) in the humid forest especially in the newly opened fields. Three unknown diseases were recorded in lowland, with one being a threat to maize producers in South West.

Most of the extended varieties planted were moderately resistant to the major diseases. In the highland; *Puccinia sorghi* and *Sporisorium reilianum* remain the major pathogens of maize. Stalks and ear rots and *Phaeosphaeria* leaf spot must be monitored carefully.

PPB also intervened in training extension agents in West Province, on the identification of maize diseases and some control measures. The meetings were organized in collaboration with the "PNVFA" Project.

The unit organized a maize diseases and pests survey in 6 provinces (South, Centre, Littoral, South-West, West, and North-West) in collaboration with the entomology unit in Nkolbisson. A maize breeder joined the team. The trip was co-sponsored by HTA and NCRE. Dr. Kitty Cardwell and Fritz Shultess from HTA backstopped the national scientists during that trip. The major diseases and pests, their incidence and severity, and their distribution were recorded.

The number of personnel in the unit is very small compared to the work load. More technicians and well trained researchers are needed.

10.1.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Maize population improvement		
1.1 Determine appropriate generation for resistance selection.	1.1 Evaluate five cycles of selection.	1.1 S0, S1, S2, S3, S4, were planted and evaluated in 1993.
1.2 Evaluate resistance of advanced maize genotypes.	1.2.1 Screen National Variety Trial and International Disease Nursery.	1.2.1 Breeder's trials have been evaluated. The disease nursery was not set up in Dschang by HTA.
Operation 2: Maize seed mycoflora		
2.1 Determine fungi present on maize seed.	2.1.1 Inventory of maize seed mycoflora.	2.1.1 This operation is still going on. Over 200 samples from farmers are evaluated.
Operation 3: Evaluate advanced sorghum lines		
3.1 Resistance to grain mold.	3.1.1 Screen genotypes for grain mold.	3.1.1 Not carried out because of misunderstanding with Project Garoua.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
3.2 Resistance to major leaf diseases.	3.2.1 Evaluate resistance to grey leaf spot.	3.2.1 Same as 3.1
	3.2.2 Evaluate resistance to <i>Anthraco</i> se.	3.2.2 Same
	3.2.3 Evaluate resistance to smut.	3.2.3 Same

Operation 4: Disease monitoring

4.1 Study of <i>P. maydis</i> in Western Highlands.	4.1.1 Biology of <i>P. maydis</i> .	4.1.1 Mycelial growth on PDA was successful. No spores were produced.
	4.1.2 Yield loss assessment due to <i>P. maydis</i> .	4.1.2 Trial was planted in Mbiyeh. Peltaflo, fungicide was used as control.
4.2 Identify diseases and determine their level of development.	4.2.1 Maize disease monitoring in Highlands.	4.2.1 We continue to monitor the development of <i>Phaeosphaeria</i> leaf Spot and <i>Physoderma</i> Spot.
	4.2.2 Sorghum and millet disease survey in Northern Cameroon.	4.2.2 Not carried out. (see 3.1)

10.1.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 Dr. Fritz Shultess and Kitty cardwell visited the unit for 10 days.
	1.2 Training	
2. Extension	2.1 Workshops	2.1 Les maladies du maïs dans les Hauts plateaux de l'Ouest - Bul. No. 1
	2.2 Publications	2.2 <i>Phaeosphaeria</i> leaf spot: a new disease of corn in Cameroon. Bul. No 2.
	2.3 Field days	2.3 None
3. Miscellaneous	3.1 Administration	3.1 None
	3.2 Leave	3.2 None

10.1.5 OTHER ACCOMPLISHMENTS

Training of Extension agents on the identification of maize diseases. Supervised students from Bambili Agricultural School.

FOLLOW-UP ACTIVITIES:

Trials will be evaluated for ear and stalk rots before harvest. The identification of alternate hosts for the major diseases will continue. The evaluation of seed mycoflora is still going on. Ngoko may participate in training course in IITA in October 1993 "Biotechnology for African scientists". Dr. Kitty Cardwell and Dr. Fritz Shultess are expected in Cameroon in September 1993.

10.2 HIGHLAND CEREALS ENTOMOLOGY

10.2.1 INTRODUCTION

The Highlands Cereals Entomology Unit, based in Dschang, focuses on cereal grain storage. The unit is characterizing farmers' storage practices and is monitoring maize storage losses. Experiments are aimed at identifying storage methods that reduce grain storage losses to the barest minimum. Determining the efficacy of using natural plant materials for grain storage protection is top priority for diagnosis and experimentation. The unit is also screening grain legumes for pest resistance. Research is concentrated in the North West and West provinces, and is being carried out in collaboration with the Bambui FLU and the Provincial Delegation of Agriculture in Bafoussam. Research activities related to rice in Northern Cameroon have been suspended due to budgetary constraints.

10.2.2 SUMMARY OF ACTIVITIES

During the period in review the researcher was very involved in regional and national programs and training workshops in and out of the country. These included the Regional Research Program for Maize and Cassava (RRPMC) in IITA from 18 - 22 Jan. 1993, the Integrated Pest Management workshop in Bouake, Côte-d'Ivoire from 26-27 Feb. 1993, the RRPMC workshop of resource persons from 3 - 5 March, 1993 to draw a syllabus for training research technicians; a training course on Post Harvest Technologies for Agricultural Extension Officers from 1 - 20 March, 1993 in Bamenda and a training course on Field Research Methods for technicians from 3 - 21 May, 1993 in Cotonou, Benin.

During March and April maize plots were established in Foubot, Dschang and Santchou to grow maize for storage trials under the RRPMC. Limited surveys of farmers' maize storage methods and the use of natural plant materials for grain storage protection were carried out in Nde Division in the West Province and Mezam Division in the North West Province.

Monthly evaluation of maize varieties stored under two methods in Foubot and Dschang was carried out. Laboratory screening of cereal and grain legume varieties for resistance to storage pests is being planned for the later part of the year.

Although rice research activities in Northern Cameroon were suspended because of budgetary constraints, a one week visit was undertaken to the area during mid-March to organize the IPM operations to be sponsored by WARDA as was the case last year.

10.2.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Use of natural plant materials for grain storage pest control		
1.1 Document plants and products presently used by farmers.	1.1.1 Farmer survey on use of plant material for storage pest control.	1.1.1 Questionnaires were completed for ten farmers who use natural plant materials for stored grain protection in Nde Division West province. Thirty names of users were collected in Mezam Division, North West Province and questionnaires will be completed later.
1.2 Evaluate mode of action of plant materials and products.	1.2.1 Collection and laboratory analysis of plant materials.	1.2.1 No collections of plant materials were made.
Operation 2: Evaluate grain post harvest losses		
2.1. Document grain storage methods in the Highlands.	2.1.1 Survey on farmers' grain storage methods.	2.1.1 Questionnaires were completed for maize farmers in Nde Division, West Province.
2.2. Quantify losses for farmers' storage methods.	2.2.1 Monitor storage losses for stratified random sample.	2.2.1 Selected farmers will be monitored starting next harvesting season. Evaluation of four maize varieties stored under two methods in Foubot and Dschang was carried out monthly.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
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Operation 3: Identify storage insect pest resistant varieties

3.1 Identify varieties that show resistance to storage insect pests.	3.1.1 Laboratory screening of grain legume varieties.	3.1.1 This operation was postponed to the next half year because Breeders and Agronomists did not supply seed.
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10.2.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
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1. Institutional development	1.1 Consultancies	None
	1.2 Training	Participated as a resource person in (i) a training course on Post Harvest Technologies for Agricultural Extension Officers organized by UNDP Food Loss Reduction Project in Bamenda from 1-20 March, 1993 and (ii) a training course on Field Research Methods for Technicians organized by IITA under the Regional Research project for Maize and Cassava (RRPMC) in Cotonou, Benin from 3 - 21 may 1993.

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
2. Extension	2.1 Workshops	(i) RRPMC/EEC workshop in IITA, Ibadan from 18-22 January, 1993. (ii) integrated Pest Management Task Force for West Africa annual meeting in WARDA, Bouake, Côte-d'Ivoire from 26-27 Feb. 1993. (iii) Workshop for a course on Field Research methods in IITA, Ibadan from 3-5 March, 1993.
	2.2 Publications	(i) Major Pests and diseases of Stored Grain in Cameroon - Their Biology and Control Techniques. (being reviewed) (ii) A technical guide on the use of Insecticides to Reduce Grain Post Harvest Losses in Cameroon (being reviewed).
	2.3 Field days	None
3. Miscellaneous	3.1 Administration	Held one coordination meeting with NCRE researchers in Dschang and issued one circular on the use of NCRE vehicles.
	3.2 Leave	Not Taken

10.2.5 TRAINING AND EXTENSION ACTIVITIES

The researcher participated in the monthly training workshop of technicians of the Ministry of Agriculture in the West Province involved in the World Bank National Program for Training and Extension. Participants are being taught the best methods of post harvest handling of food crops to minimize losses.

10.3 LOWLAND CEREALS ENTOMOLOGY

10.3.1 INTRODUCTION

The goal of the Lowland Cereals Entomology Unit is to develop recommendations for control of Lepidopterous field maize borers in the humid and sub-humid forest. In the past, emphasis was given to on-farm assessment of chemical control options. Based on this research, tentative recommendations were developed for Marshall seed treatment in the forest-savanna transition zone and carbofuran in the forest zone.

The unit now is emphasizing integrated control methods which hopefully will be less costly and more sustainable. Research on sustainable control encompasses a search for resistant varieties, assessment of cultural practices, and attempts to develop biological control using natural enemies. Experimentation currently is focusing on resistant varieties and cultural practices. As a first step in developing biological control, extensive field monitoring is being carried out in conjunction with laboratory studies in order to assess borer species distribution, and the role of host plants and natural enemies. Population surveillance, especially in farmers' fields, is being used to tailor research activities to suit the needs of farmers in different ecological zones.

10.3.2 SUMMARY OF ACTIVITIES

Due to the problems at IRA few planned activities were accomplished during the first season. The trials that were started were planted late which affected germination and yield. We expect the second season to be better.

10.3.3 ACCOMPLISHMENTS

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 1: Pest monitoring		
1.1 Baseline information on incidence, severity and losses.	1.1.1 Diagnostic survey with sampling in farmers fields.	1.1.1 60 farmers fields surveyed in 5 provinces in collaboration with PHMD/IITA

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
Operation 2: Biological control of maize borers		
2.1 Evaluate role of natural enemies in borer population suppression.	2.1.1 Monitor incidence of parasites across locations.	Planned for the second season
	2.1.2 Rear borers for parasite emergence and identification.	2.1.2 None during this period
2.2 Evaluate host plants as sources of infestation.	2.2.1 Village sampling from maize and native grass hosts.	2.2.1 Planned for the second season
Operation 3: Developing sources of resistance		
3.1 Identify resistance maize varieties.	3.1.1 Test varieties under natural and artificial infestation.	3.1.1 Planned for the second season.
Operation 4: Cultural practices		
4.1 Assess effects of field management practices on borer populations and yield losses.	4.1 Influence of intercropping maize with groundnut and cassava on borer populations.	4.1 A maize/manioc association trial was established at Minkoameyos and Ntui. A crop association survey was started. Over 150 farmers were contacted.

10.3.4 OTHER ACTIVITIES

OBJECTIVES	ACTIVITIES	ACCOMPLISHMENTS
1. Institutional development	1.1 Consultancies	1.1 None
	1.2 Training	1.2 None
2. Extension	2.1 Workshops	2.1 None
	2.2 Publications	2.2. An Information Pamphlet was prepared for field identification of maize insects.
	2.3 Field days	2.3 None
3. Miscellaneous	3.1 Administration	3.1 None
	3.2 Leave	3.2 None

10.3.5 OTHER ACCOMPLISHMENTS

During our survey of crop associations there was excellent assistance and collaboration with the extension agents, Chief of Agricultural Posts, Délégués d'arrondissement and Délégués Départementaux.

11. LIST OF NCRE RESEARCHERS

11.1 International Staff

Name	Title	Unit
<u>Nkolbisson</u>		
1. Dr. Emmanuel A. Atayi	Chief of Party	Administration
2. Dr. Thomas C. Stilwell	Deputy Chief of Party	Administration
3. Mr. Gregory Servant	Administrative Officer	Administration
4. Dr. Doyle Baker	Agricultural Economist	Economic Analysis
<u>Bambui</u>		
5. Dr. Charles Yamoah	Soils/Agroforestry Coordinator	Agroforestry
<u>Ekona</u>		
6. Dr. Humphrey Ezumah	Systems Agronomist	Testing and Liaison
<u>Maroua</u>		
7. Dr. Mulumba Kamuanga	Agricultural Economist TLU Coordinator	Testing and Liaison

11.2 National Counterparts

11.2.1 In Country

Name	Title	Unit
<u>Nkolbisson</u>		
1. Dr. Jacob Ayuk-Takem	Maize Breeder/Director	National Coordinator
2. Dr. Pauline Zekeng	Systems Agronomist	Testing and Liaison
3. Mr. Francois Kaho	Systems Agronomist	Testing and Liaison
4. Mr. Augustin Fouaguegue	Agricultural Economist	Testing and Liaison
5. Dr. Charles Thé	Maize Breeder	Maize Breeding
6. Mr. Celicard Zonkeng	Maize Breeder	Maize Breeding
7. Mr. Jean Bosco Zangue	Maize Breeder	Maize Breeding
8. Mr. Roger Nkoa	Maize Breeder	Maize Breeding
9. Mrs. Regine Aroga	Entomologist	Entomology
10. Miss Ndemah Rose	Entomologist	Entomology
<u>Foumbot</u>		
11. Dr. Edward Ngong Nassah	Systems Agronomist	Testing and Liaison
12. Mr. Isidore Tabi	Maize Breeder	Maize Breeding
<u>Bambui</u>		
13. Mr. Marc Samatana	Agricultural Economist	Testing and Liaison
14. Mr. Francois Meppe	Systems Agronomist	Testing and Liaison
15. Mr. Jean Enam	Agricultural Economist	Testing and Liaison
16. Mr. Christopher Ngong	Agronomist	Agroforestry
17. Mr. Martin Nguegum	Agronomist	Agroforestry
18. Dr. Pierre Tchamo	Maize Breeder	Maize Breeding
19. Mr. Mbassa Ndioro	Maize Breeder	Maize Breeding
20. Mr. Zachee Ngoko	Plant Pathologist	Plant Pathology
<u>Dschang</u>		
21. Mr. Pascal Ngninbeyie	Rice Breeder	Rice Breeding
22. Dr. Joseph Tchatchoua	Pathologist	Rice Pathology
23. Mr. Cletus Asanga	Entomologist	Cereals Entomology
<u>Ekona</u>		
24. Dr. Manfred Besong	Agricultural Economist	Testing and Liaison
25. Mrs Christine Poubom	Systems Agronomist	Testing and Liaison

Name	Title	Unit
Maroua		
26. Mr. Martin Fobasso	Systems Agronomist	Testing and Liaison
27. Mr. Endondo Chevalier	Legume Agronomist	Grain Legume
28. Mr. Ousmane Boukar	Legume Specialist	Grain Legume
29. Mr. Fokou Joseph	Rice Agronomist	Rice - North
30. Mr. Richard Kenga	Sorghum Breeder	Sorghum Breeding
31. Mr. Jacques Beyo	Sorghum Breeder	Sorghum Breeding
32. Mr. Andre Djonnewa	Sorghum Breeder	Sorghum Breeding
33. Mr. Ranava Ndikawa	System Agronomist	Testing and Liaison
34. Mr. Abba Adamou	Agricultural Economist	Testing and Liaison
Garoua		
35. Mr. Blaise Mongmong	Maize Breeder	Maize Breeding
36. Dr. Julius Takow	Soil Scientist/Rice Agron.	Rice - North
37. Mr. A. Youri	System Agronomist	Cereals Agronomy
38. Mr. Anatole Ebete	Systeme Agronomist	Cereals Agronomy

11.2.2 National Counterparts In NCRE Training

Name	Title	Unit
1. Mrs. L.A. Enyong	Systems Agronomist	TLU-Nkolbisson/ Virginia Poly
2. Mr. Georges Dimithe	Agricultural Economist	TLU-Nkolbisson/ Michigan State
3. Miss Mankolo Regine	Systems Agronomist	TLU-Nkolbisson/ Virginia Poly.
4. Mr. Pierre Boumtje I.	Agricultural Economist	TLU-Nkolbisson/ Univ. Illinois
5. Mr. Blaise Aubin Nguimgo	Systems Agronomist	TLU-Nkolbisson/ Univ. Nebraska
6. Mr. Jacob Eta-Ndu	Maize Breeder	Maize Breeding-Bambui/ U. Minesota

Name	Title	Unit
7. Mr. Claude Nankam	Plant Pathologist	Plant Pathology-Bambui/ Univ. Ill.
8. Mr. Fabien Jeutong	Rice Breeder	Rice Program Dschang/ U. Nebraska
9. Mr. Birang a Madong	Rice Breeder	Rice Program Dschang/ U. Arkansas
10 Mrs. Comfort Ateh	Systems Agronomist	TLU-Ekona/Wisconsin State Univ.
11. Mr. Charles Njomaha	Agricultural Economist	TLU Maroua/Oklahoma State Univ.
12. Mr. Titus Ngoumou	Cereals Agronomist	Cereals Agron. Garoua/ Cor. Univ.
13. Mboussi Messia	System Agronomist	TLU-Ekona/Univ. Arkansas