

**EVALUATION REPORT**

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**NORTH SHABA RURAL DEVELOPMENT PROJECT**

**(Extension Component of Research and Extension Sub-System)**

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### Agricultural Extension, Project North Shaba

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## I. INTRODUCTION

### Project Background and History:

Project North Shaba (PNS), an integrated rural development Project started its operations in April 1977. It is jointly funded by USAID - \$13.4 million (technical assistance and commodities) and Government of Zaire (GOZ) contributing comparable amount in local currency over the seven year life of Project, ending September 1983.

Project headquarters are located at Kongolo in the Tanganyika Subdivision of Shaba Province. This particular region of Zaire is isolated both in the physical and psychological sense. Air and bus services do not exist in the area. Bi-weekly train service operates in the area which would take several days to connect with nearby regional population centers. Project communications with Kinshasa and other relevant organizations are by means of radio and a single-engine aircraft which flies project personnel in and out of the Project headquarters. Roads in the project area have considerably improved since project began its operations. Inadequate and minimal health facilities exist in the region. Recreation facilities are virtually non-existent.

While the project officially began in July 1977, it did not begin to operate until late in the planting season of 1978, and activities began to have impact only from the planting season of 1979. The long lead time required was due to

the problem of finding qualified expatriate technicians to work in North Shaba (even qualified Zairian Personnel), USAID's selection process of expatriate technicians, logistical problems of moving project personnel and material into North Shaba, etc. Thus, the Project's problems began with its inception and were never truly overcome at least in the case of expatriate technicians. These problems were compounded by the Katangese rebellion of 1978 (April-June) which did not help the recruitment of long-term technical advisors.

#### Agricultural Background:

Geographical area, covered by PNS, has been traditionally viewed as the "breadbasket" of Shaba Province. Maize exports from the region, traditionally, supported the urban populations of the mining towns in South Shaba. Sudden drop in corn production, in the mid-1970s to as low as 6,000 MT's and corresponding need to import corn into South Shaba, resulted in the initiation of Project to promote increased production of maize in North Shaba and its movement to urban markets.

Even today, as in the past, farmers of the North Shaba area practice slash and burn type of farming. Traditionally, farmers clear the forest and tropical vegetation with axes and machetes, and burn the undergrowth. Clearing and burning operations begin in the period May through July and with the onset of rains in September various crops are planted. All agricultural operations are carried out manually, using a hand-hoe. Labor is provided by the farmer's family with small amounts of hired labor. Hired labor is used (Pygmy labor) most often in the forest region than in the savannas. Two major agroclimates are noticeable in the area: forest and savanna regions. Savannas

are not true savannas but secondary forests. The so-called savannas have been cleared and have been under cultivation for long period. In the forest region , soils are relatively rich compared to the soils in savannas. That is the main reason for the higher productivity of forest soils. Average rainfall in the area is about 900-1200 mm per year. Rainy season starts about early in September and last about four months. Occasional rains fall during January-April. Rainfall is fairly steady and evenly distributed.

Major crops in the area are maize, manioc, peanuts, rice, beans, and cotton. Corn is grown both as a sole crop and as a mixture with rice and peanuts. Manioc is mainly grown as a sole crop and so is cotton. Occasionally, a few plants of corn can be noticed in cotton fields as well as sweet potato on the field borders. According to reports, even where corn is grown with rice and peanuts, corn population dominates the field. Thus, peanut and rice mixtures seem to be secondary and only small surpluses are marketed. Cotton is harvested and sold and is not converted into any products at the village or family level. Collection of palm nuts, processing and extraction of oil, both for family consumption and sale, are important aspects of farming. Palm oil, therefore, contributes significantly to the agricultural-product mix at the family level and hence on the allocation of family labor resources. Palm oil is the basic medium of cooking.

There are two agricultural seasons. Main agricultural season begins in September. Corn and other food crops are planted in September. Second season begins in December-January. Cotton is the main crop during second season. Planting of cotton begins from mid-December to mid-January and continues until February. A small amount of corn is sown in the second season.

Within the project area, there are significant differences in food consumption patterns. In the sectors of (Kongolo and M'Bulula), maize is the principal food crop, followed by manioc. Hence, part of the harvest is stored for consumption and the surplus is sold. In the Nyunzu sector, manioc is the main food crop and very minimal quantities of maize is consumed. Maize in this sector, is the principal commercial crop. This explains, perhaps, the lack of traditional storage system in the Nyunzu area.

There is a high degree of post-maturity losses of corn (as against post-harvest) in PNS area, particularly in the forest areas. Matured corn is left to stand in the fields till the marketing season approaches (May-June). Summer winds and weakened stems lead to crop lodging, which in turn leads to rotting of corn and attack by termites. According to estimates, 20-25% of mature corn is lost in this way. Our own impressions of the fields and harvested corn on the cobs confirmed the high degree of losses. This is yet another potential area of intervention for PNS to study.

At the beginning of the Project, institutional aspects of agricultural development were weak and ineffective. There was no applied research in the area. Extension agents of the Department of Agriculture (DOA) were not promoting agricultural development. They were seen more as tax collectors rather than development agents. Farmers were thus totally isolated from the development processes. Cotton extension agency (ESTAGRICO) had just started its activities. Agricultural technical school in the area (Ecole Technique Agricole de Kasaya) reopened in late 1975 after many years of closure. Therefore, it is no exaggeration to say that the lines of communication with farmers were initiated by a development agency, for the first time, since Project North Shaba began in 1977-78.

Project Goal and Purpose :

Project Goal : "is to achieve self-sufficiency in maize production within the shortest possible time-frame" (PP page 64)

Project Purpose: "is to identify an effective rural development process for improving small farmer production and income which is replicable in other parts of Zaire. The process by which this will be accomplished builds on the current practices of farmers with innovations being introduced only after they have tested and grown on farmers' own lands". (PP page 64).

Objectives of Research Extension Subsystem:

To achieve the Project goal and purpose, a sub-system of research and extension was conceived with "operations directed towards the development and delivery of improved maize and other crop technologies".

The main objectives of this sub-system were :

- 1) develop, test and introduce maize and other crop technologies tailored to the farming systems in the various localities;
- 2) recruit and train extension workers to provide timely and appropriate technical advice as appropriate technologies are developed; and
- 3) create a system that allows ongoing communication among extension workers and their trainers, the farmers of the project area and researchers.

The following outputs were expected from the extension component of the Research and Extension sub-system.

1) Development of an effective extension system that can be replicated in other parts of Zaire. Several principles to guide the development of such a system have been identified jointly with DOA; briefly stated, the principles were (PP page 18-79)

- a) farmer involvement in decision-making, i.e., the development, testing and delivery of improved technology
- b) development of effective relationships between farmers and extension workers replacing the traditional police functions of the extension workers with communication and educational functions.
- c) linking extension operations with research to ensure feedback to the research staff of farmers' experiences with innovations and thus aid in the development of meaningful innovations.
- d) accountability of extension personnel to the local population being served by the Project
- e) developing a system of para-professional "extension workers" to help the diffusion of improved practices while reducing the burden on government to support extension operations.

2) Development of an effective extension organization beginning with selection of villages; organizing village centers; organizing councils of farmers consisting of representatives from major farming groups in the area; recruitment of extension agents (agricultural assistants); training of extension agents; and assigning the extension agents to village centers.

3) Other outputs expected of the extension system were: training of farmers at Mbulula research center; instituting special programs for training women in agriculture; coordinating extension activity with the agricultural programs of primary and secondary schools; assisting Pygmy farmers; and farmers' training.

Expected Outputs of Extension Organization

The following outputs were expected according to the log frame in original PP. ( Research and extension sub-system: )

- a. 75 Agricultural assistants, 20 mid level extension staff, 4 senior level extension staff trained and operational by 9/1982 (same in Revised PP).
- b. 225 Farmers' council leaders receive para-professional training by 9/82 (Revised PP.75 by 9/82).
- c. 25% of small farmer participants adopt-extended "best currently used" crop technologies by 5/79; 50% by 5/80 (Revised PP 2500 small farmers adopt new seeds by 12/29. 1200 each by 9/83).
- d. 25% of small farmer participants adopt extended new (non-imported ag. " inputs) technologies by 8/81, 50% by 5/82 (Revised PP: 3000 by 12/81 6000 each by 12/83).
- e. 75% of small farmer participants show changes in agricultural techniques by the end of Project. (Revised PP 15000 by 1986).

Further, DGF subsystem outputs, relevant to agricultural extension are indicated below.

- a. Farmers councils and sub-councils initiated :  
10 by 9/77, 25 by 9/78, 55 by 9/80, 75 by 9/81.

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"As an example of confusion in the PP, this writer wonders as to what is the difference between "extended best currently used technologies" and "extended new technologies". Further outputs in(d) are in addition to those referred in(c) or above the 1977 or 1978 base?

Evaluation Methodology :

Observations, facts and impressions presented in this report are based on the following :

1. Review of Project related documents with USAID/ Kinshasa, DAI and PNS.
2. Data provided by the Project Personnel
3. Discussions with PNS Staff
4. Interviews with field agents (R&V:DGF)
5. Interviews with farmers
6. Interviews with other agencies in the area : DOA, ESTAGRICO, Ecole Technique Agricole de Kaseya.

Limitations: In any evaluation of this type, the evaluator by necessity has to depend on the longitudinal data generated by the project towards its goal achievements; periodic reports submitted to the funding agencies (GOZ & USAID case) and supplement the data by observations in the field and discussions with the project clientele, project personnel and relevant agencies in the area. However, lack of longitudinal and baseline data was a severe handicap. Limited data that is somewhat reliable is available only for the year 1980 and 1981".1) According to senior PNS Staff pre 1980 data should be used with the "bag of salt", and not the proverbial "pinch of salt". These are the limitations faced by this evaluator (and of course others) in nailing down quantitative measures of achievement as they relate to yields, production and area under cultivation. It is suggested that readers should take cognisance of these limitations. Even the data presented by PNS and the implementing contractor are often at variance.

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1) "SCAD, the unit responsible for data collection and monitoring has been in operation only since the last two years.

In a Project like PNS, various systems are to be viewed as mutually supporting and enteracting. Therefore, in discussing extension component of the research and extension subsystem, occasional references are made to research and certain other sub-systems which have a direct influence on the working of extension organization.

## II. PREVIOUS EVALUATIONS

Observations and recommendations of the three earlier evaluations are summarized below:

### Dimpex Evaluation (June-July 1979):

Mid-course evaluation conducted by Dimpex Associates noted the following observations :

1. Intensification of training of PNS extension agents using facilities and Personnel at M'Bulula
2. Farmers training at Ngaba station: evaluation seriously questioned the idea of training farmers at Ngaba during the cropping season.

### DAI, Internal Evaluation (Nov. 1980)

DAI, internal evaluation of November 1980 noted the following with respect to the status of agricultural research and extension at PNS :

1. The topics of agricultural research in PNS have been variety trials (maize, groundnuts); planting date (maize); mixed cropping (maize, beans, rice); rotations (maize, cotton, manioc, groundnut, sesame); land preparation (maize), fertilizer levels (maize); and diseases (maize).
2. PNS research organized at three levels. "First level of research is being executed currently on four trial stations - Ngaba, Kongolo, Nyunzu and Kilbui". (P38). Majority of the activity occurred on the station at Ngaba.  
Second level is the diamond maize trials in 16 farm centers (78-79) and in 18 farm centers (1979-80).  
Third level is the promotion of recommended practices on the basis of "demonstration fields". Use of improved seed had resulted in a 20-25% increase in yield over local varieties.

3. Regarding technical package : a) PNS research consists primarily of testing the PNM/CIMMYT maize production package at the expense of testing any other production techniques; much of the research at PNS has been piecemeal and unsystematic; b) current package includes improved seed, early planting (Sept. 15), row planting, and increased density (75 cm x 50 cm x 2 plants). Further, this evaluation refers to the "nature of potential risks to farmers in adopting this package is known, no effort has been made to assess the trade-offs between increased benefits and increased risks".
4. Very little attempt has been made to understand existing farming systems and there is no systematic effort to adapt the PNM package to conditions in North Shaba.
5. Technical assistance: "the team has been seriously deficient in certain technical skills and has suffered from a general inability to transfer knowledge to local personnel"...Overall, the quality of technical assistance provided has not been adequate to accomplish Project objectives".

It is to be noted that DAI's observations quoted above are misleading and confusing. Firstly research is not executed at four stations, only minimal research effort made, is at the Ngaba station.

Secondly, the observations about "known potential risks to farmers in adopting the recommended practices": We would like to ask what known potential risks exist and of what magnitude? No doubt to some extent such statements and less than adequate technical assistance provided to PNS, has been partly responsible for the confusion, vacillation and ambiguity observed to exist in the PNS extension service <sup>1</sup>.

With due caution, it is to be noted that PNS is a fairly viable and productive package. I should truly be called as a set of viable interventions rather than a technical package in the conventional sense of the term. The practices recommended

1. Quote from DAI, 1980, internal evaluation. "The research program should organize its on-station trials, field trials (i.e., "demonstration" fields), and on-farm trials (champs d'encadrement) to be representative of these specific production environments". The authors of the above report seem to be confused about demonstrations and on-farm trials.

are by and large risk free and do not involve cash expense on the farmer's part except for seed. Thus, the package is a low risk package; since the superior yield of the seed has been proven in demonstrations.

DAI's Internal Evaluation - March 1982 :

This report's purpose was to assess progress towards stated objectives of the Project and to determine whether successful elements of the Project might be sustainable over the long term, beyond the period of external donor assistance". Major observations and recommendations of this report are summarized below :

1. Problems of staffing: 3 different directors of R&V<sup>a</sup>, in less than five years (Zairois), and two expatriate advisors in less than three years. Therefore, no sustained research program with continuity and direction. Thus, research effort was mismanaged all ill-conducted due to problems of staff and logistics.
2. Attempts to produce improved seed at farm level resulted in a fiasco by the inability of PNS to supervise seed production fields and lack of money to buy what was produced.
3. Data collection from 900 farmers to study and analyze farming systems.
4. Extension activities :  
Promotion of Kasai-I Package;

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a R&V Research and extension.

5. Training of extension agents in July of each year in all major crops of the area

Progress to date :

1. R&V is working with 85% of the target population as of 1981-82 crop season.
2. 52% of the farmers within the PNS area (farm centers) adopted improved seed.
3. 28.9% of the farmers within the PNS area (3,705 out of 12,832 farm households) have adopted some or all of the improved practices
4. 60 farm centers established (80% of 1983 target)
5. Farmers produced 66,000 tons in 1980-81 - 134.7% more than the 1983 target.
6. Corn exports from Project area increased from 5,904 tons in 1977 to 32,383 in 1981 - an increase of 432.6% or an increase from 57 kg (1977) to 308 kg (1981) per household. "This increase has resulted from a combination of better prices, improved infrastructure, PNS package and increased acreage brought under cultivation". (Prices of corn increased from 10 Zaires per metric ton in 1977 to 60 Zaires per ton in 1981.

Problems Encountered :

1. diversifying extension activities;
2. re-orienting extension approach from single crop approach to multi-crop approach;
3. providing technical assistance in agronomy and extension;
4. increasing the number of farm centers;
5. closer collaboration with Estagrigo.

**Summary:**

A common thread in all the three evaluations is the recognition of the following weaknesses in the Project :

1. Lack of a well tested package (it does not seem to be a serious drawback to this evaluator. See section on Technical Package),
2. (a) Need for understanding farming systems in the area.  
(b) Research and extension approach based on farming systems.
3. Need for improving the quality of extension work through training.
4. Poor quality and quantity of technical assistance totally inadequate to meet the project goals and objectives.

### III. ORGANIZATION OF PNS EXTENSION SERVICE

#### Structure

PNS Area is divided into three sectors: Kongolo, M'Bulula and Nyunzu. Each sector is divided into zones (composed of 3-4 agricultural centers) and Agricultural Centers (composed of 3 to 5 villages). PNS Extension Service thus is a four tier structure. At the top is the Chief of the Research and Extension Sub-System. Below him each sector is headed by Charge' de Vulgarisation who is assisted by an Assistant at zonal level (Assistant de Vulgarisation) who in turn supervises several agricultural centers (Centres Agricoles). Each agricultural center is covered by an extension agent called as Vulgarisateur. See Appendix A, table 1

There are at present 60 agricultural centers in PNS area: Kongolo sector (22 centers); M'Bulula Sector (25); and Nyunzu sector (13).

#### Staffing

Zairian agricultural service consists of four levels of trained manpower; designated as A0, A1, A2 and A3, in the descending order of hierarchy, based on number of years of training. Each level is briefly described below.

A0: Ingénieur Agronome

A total of 11 years after Ecole Première  
(Humanité agricole (2), Etude Agricole (4), Etude Supérieur (5))

A1: Ingénieur Agronome Technicien

A total of 9 years after Ecole Première  
(Humanité Agricole (2), Etude Agricole (4), Etude Supérieur (3))

A0 and A1 are Senior level positions. A0 personnel are assigned to research institutions while A1 level personnel are assigned to field and administrative positions.

A2: Agronome

(A total of 6 years after Ecole Première, Humanité Agricole (2), Etude Agricole (4)).

Mainly middle level extension workers

A3: Agronome

(A total of 4 years after Ecole Première)

Lower level extension workers, also called as moniteurs.

PNS extension service is staffed by Ingenieur Agronome(A0) as the chief of research and extension subsystem and Ingenieur Agronome Technicien (A1) at the sector level and Agronome A2 at the zonal level and Agronome (A3) at the agricultural center level. Agronome (A3) at the agricultural center level is the extension agent who is directly in touch with the farmers. Intermediary position at the zonal level, (Assistant de Vulgarisation) is sometimes staffed by an experienced Agronome A3.

Village level agents (Agronome 3) tend to be very young and fresh out of the training center. PNS selects the agents at the end of training after administering a test. Selected agents are given a short training course of 3-4 weeks before being assigned to a village center.

#### Level of Support

Logistics: Chief of the Research and Extension Sub-System is responsible for the extension activities. He is located at M'Bulula, at the agricultural research and training center and is provided with a vehicle. Sector chiefs (charge' de vulgarisation) are located at sector headquarters and are provided with Honda motorcycles. Zonal chiefs reside at one of the centers within their zones, are provided with motorcycles and supervise 4-5 agricultural centers. Village level extension agents (vulgarisateurs) live at the agricultural center, are provided with bicycles and cover villages(5-6) within the center. Logistical support as currently provided seems adequate.

Technical Support: Village level extension agents receive technical support (supervision and advice) from the two levels immediately above them i.e. Assistant Vulgarisateur and Charge' de Vulgarisation. From observations in the field and discussions with various extension workers, it is to be said that PNS extension workers are severely handicapped by lack of basic technical literature and basic field equipment which every extension workers should have (eg. measuring tape, cords and field balances).

Lack of technical support becomes very serious when it is seen in conjunction with the less than adequate quality of pre-service training received at the training center. A visit to one of the training centers in the area and discussion with knowledgeable people in the area confirmed our fears regarding the quality of training offered. Training center itself was devoid of anything remotely resembling a library and instructors were out of touch with the current state of art either in extension methodology or the production techniques of major crops in the PNS area. PNS should take immediate steps to provide PNS extension

staff at all levels with field oriented technical literature manuals and field equipment.

#### Extent of Coverage

As of April 1982, extension service of PNS reaches 12 833 agricultural households out of a total of 25 561 approximately 50% of the households of the area. (See Appendix A, Table 2).

#### Linkage Between PNS And Other Agencies In The Area

Within the North Shaba - PNS area there are two other extension agencies, dealing with farmers. Dept. of Agriculture (DOA) and ESTAGRICO, the parastatal cotton development agency.

DOA has a three tier extension system operating almost parallel to the PNS extension agency. DOA's extension service in North Shaba is divided into two zones: Kongolo and Nyunzu. Each zone is headed by Agronome de Zone (A1 level) and is divided into subunits called collectivites, which are headed by Agronome de Collectivite' (A2 level). Each Collectivite' consists of several villages. There are several extension agents in each Collectivite', called as Moniteurs (A3 level). Each moniteur is responsible for a group of villages, generally 5-6. The morale of DOA's extension service is very low. The middle and lower level are poorly paid, and are not provided with any means of transportation. Only Agronome de zone, is provided with a vehicle and meagre allowance for gasoline (POL), which we were told was enough for just 3 months and often funds are not available at required times to buy the POL. Further, DOA's moniteurs are paid pitifully low salaries and we have been told that they have not received salaries for the last three months. During our visits to village it was confirmed that DOA agents do not visit the villages to promote agricultural development. These occasional visits are confirmed to tax collection and enforcement. It should be noted that ever since the colonial times, DOA agents have been used as law enforcers and tax collection agents. Therefore their philosophical and attitudinal orientations are far from those required of extension agents in the true sense of the term. It is also said that the quality of DOA agents is far below that of PNS agents, who have at least received additional training. PNS at present does not have any linkage with DOA's extension service, even though both are expected at least in theory, to be dealing with the same clientele. The reasons noted above are among the obvious ones for the cool and distant relationship between the two agencies. Yet our discussion with both PNS and the two zonal agronomists of

DOA, indicated that there are possibilities of coordination between the two agencies which should be seriously explored. The possibilities are discussed elsewhere in this section.

The second agency in the area ESTAGRICO (Societe' Cottoniere et Agricole de l'Est du Zaire) is a parastatal organization between cotton industry and Govt. of Zaire designed to promote cultivation of cotton. ESTAGRICO has a four tier extension service in the North Shaba area. At the lowest level in contact with the farmers is a Moniteur/Propagandist (level A3 and lower) covering about 200 farmers. At the third level are Auxiliaires (A2 and experienced A3's) supervising 5-8 moniteurs. At the second level are Agri-postes (A2 and A1 level) supervising 2-4 Auxiliaires, depending on the size of the area. At the top is an Ingenieur Agronome (expatriate) assisted by an adjoint (A1).

Morale of ESTAGRICO agents seems to be far above the DOA agents, mainly because of better logistics and higher salaries. Several Moniteurs and Auxiliaires are provided with bicycles (rest are being provided). Agripostes are provided with motorcycles. There are at present 250 moniteurs/propagandists, 35 auxiliaires and 9 agripostes and two Ingenieurs in the organization. At present there is no linkage between PNS and ESTAGRICO. In the past a few ESTAGRICO agents participated in the PNS training program.

#### Possibilities of Linkage

As indicated earlier there are differences in the three agencies as to salaries, and resources provided to the extension personnel. The possibilities are more favourable for linkage (ccordinateurs) between PNS and DAO agents with ultimate integration of the two agencies. As large amount of PNS extension staff payroll comes out of GOZ funds linkage with and integration would seem to be economic and efficient. Certain proposals (written) in this regard have been made by PNS Director to the Govt. of Zaire, but have not been followed up. PNS has made limited and feeble efforts to develop linkages with DOA. Such efforts were limited to inviting DOA agent's participation in the training program in 1980. While DOA was apparently willing to participate, requested transport and per-diem allowance for its staff to attend the training program. As PNS was either unable or unwilling to pay the costs, DOA agents refused to participate in the program. No further efforts were reported in seeking and establishing collaboration and linkage between the two agencies.

The following suggestions are made to develop linkages with the DOA's

extension organization in the area.

1. Request participation of all DOA moniteurs in the PNS area, in the training program. This is essential to improve the quality of DOA moniteurs. Project, being relatively better placed in terms of resources, should extend transport and daily allowance to enable DOA agents to attend the training. These allowances would be minimal and within the project means.
2. Project should consider providing bicycles to DOA moniteurs (one time cost, with no commitment to repair costs) in the PNS area.
3. DOA should transfer the technical control and direction of moniteurs to PNS. (Similar proposal was made earlier in 1979) USAID/Ministry of Ag, GOZ, should use their leverage with DOA to bring about this linkage.
4. A mechanism of coordination between PNS extension supervisors and DOA supervisors (Agronome de zone, Agronome de collectivite's) should be established.

While these steps alone do not lead to ultimate integration they would provide ideas and experience which could be employed in integrating the agencies. Such an integration, in the PNS area, has wide possibilities of replication in other parts of the country. Had steps towards establishment of linkages between agencies been taken by PNS, it would have provided some replicability of the project processes, applicable to other parts of Zaire.

Linkages between PNS and ESTAGRICO:

Resource and training-wise PNS and ESTAGRICO agents are somewhat similarly placed. The following limited steps are suggested in developing collaboration between the two agencies.

1. PNS should invite the ESTAGRICO supervisors to serve as instructors/resource persons in the training program.
2. ESTAGRICO conducts periodical village level training for cotton extension agents. PNS extension agents should be required to participate in these one-day sessions. These steps would be essential if PNS has to implement a multicrop approach compared to single crop approach as is done at present.

#### Extension Methodology in PNS Area

Extension methodology followed in the PNS area consists of two basic

methods. Firstly, direct contact with the farmers using discussion and persuasion. Secondly, convincing farmers thru demonstrations on the farmers fields. There is a potential for using group meetings just prior to sowing and before harvesting and marketing. Group meetings have two basic advantages. They should be used for educating other farmers through sharing of experiences of farmers who had good harvest and for obtaining feed back about the recommended practices. This has not been practiced in PNS so far and should be encouraged.

(A) A major observation relates to the demonstrations conducted in PNS area. No demonstrations were conducted during the cropping season, 1981. In earlier years too few demonstrations have been conducted on farmers fields. Two demonstrations per agricultural center, at the minimum, seem to be optimal, considering the low adoption of large number of recommended practices.

Second observation relates to the design of demonstrations (dispositif). Serious questions of logic could be raised as to the design of demonstrations. Two designs were followed:

1. Four plot design (called as diamond plot design)
  - Improved Variety + Recommended Practices (IV + RP)
  - Improved Variety + Traditional Practices (IV + TP)
  - Local Variety + Recommended Practices (LV + RP)
  - Local Variety + Traditional Practices (LV + TP)

IV	IV	IV	IV
RP	TP	RP	TP

2. Eight plot design (Champs de sites)

Same treatments as above but each treatment is repeated with and without fertilizer, thus making it a 8 plot demonstration. Thus the demonstration would have 8 plots arranged in straight line or arranged in two rows of 4 plots each. This was reported to be discontinued during the 1981 season.

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IV + RP + F  
 IV + RP - F  
 IV + TP + F

IV + RP - F  
 LV + RP + F  
 LV + RP = F


LV + TP + F  
 LV + RP - F

The following questions could be raised about the two designs. About the first design:

- why traditional practices are recommended with improved variety?
- Why recommend improved practices with local variety?
- Are we not giving confusing messages to the farmers?

Extension message must be clear, specific and un-ambiguous. We are recommending improved seed and a set of practices to go with it. Let that alone be demonstrated against farmers seed and his practices. The main idea behind a demonstration is to provide local proof about the superiority of recommended practices.

About the 8-plot design the following questions are raised:

- what is the PNS policy regarding fertilizer use?
- is fertilizer a component of technical package at present?  
Obviously not. Then why demonstrate.
- Is it not confusing to the farmer to lay out such a demonstration on his field?
- Has PNS developed a policy of fertilizer procurement, credit and distribution system?
- Is PNS ready to provide farmers with fertilizers if they are convinced and ask for it? Obviously PNS is not yet ready. Then PNS would be creating a dangerous credibility gap between promise and performance.

Similar questions were posed to the field agents and their response was that they did not agree with the design but were advised to follow the TDY experts advice. In fact there exists confusion in the extension service as to whether these are demonstrations or research trials. It is recommended that both the 4 plot and 8 plot demonstrations be discontinued and simple two-plot demonstrations be conducted on farmers fields using improved seed + recommended practices and local seed + traditional practices, so that the intended message is clear and specific and farmers can easily judge the differences.

IV	LV
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Further there is no evidence of demonstrations in PNS ever having been used as either educational or training tool. No written records exist on any of the demonstrations conducted. There is no record developed for agents

to record the observations on demonstrations. It should be noted that demonstrations are powerful tools not only for convincing farmers but also for training of extension agents and in providing feed back to the researchers. Well planned and executed demonstrations could serve as tools of operational research. This is a serious short coming of the planning and supervision of PNS extension program.

(B) A serious lacuna in the extension service is the lack of written material/instructions about the package being promoted. It was observed that not a single extension worker contacted had printed/typed instructions about the package. First step in promoting a set of packages is to provide written instructions to extension agents, however, simple the practice is. This helps not only understanding but consistency in advocacy of the practices. Good written instructions also provide in-depth information about the reasons for the recommendations. About certain practices (plant population and date of sowing) there was somewhat different understanding among certain extension agents. This could have been prevented if there was a set of instructions for every one to follow. This is an alarming failure on the part of senior staff of PNS. Such instructions could have been provided (typed, duplicated or photocopied with simple illustrations) at a very negligible cost to the project, compared to the glossy brochure produced by the project at a huge cost of over \$7000; which has no educational value as far as the farmers or extension agents are concerned.

#### Role of Farmer's Groups

This section addresses the role of the sub-system DGF (Development des Groupements de Fermiers).

Two tasks of this sub-system are to help establish farmers councils (Conseils de Cultivateurs) and create farmers associations or farmers groups (Groupement de Fermiers).

In the first instance farmers councils are mainly representative bodies of farmers who live within the geographical area formed by the agricultural center. Its main function is to serve as a link between extension agency and the farming community at large. No economic functions are attributed to this group. The problems of introducing economic activities into this group are discussed in a separate report and thus would not be elaborated here (see Andr e Black-Michaud's report for details). In the second case farmers associations are formed with economic objectives. For example pooling and selling of corn, renting of a truck to take the pooled grain to the market to obtain better price, bulk purchase of

soap and salt, etc. Mostly farmers associations are small groups of farmers, related either by patrilineal or matrilineal connections or groups of extended families occasionally one or few members deriving some economic advantage. These groups are active mostly during the marketing period of corn.

To date DGF has helped form 14 farmer's councils (out of a possible number of 60 or one for each agricultural center) and 27 farmers associations (men) and 11 farmers associations (women). Major activity of farmers associations has been for joint marketing of grain and very limited activity in the area of purchase and resale of soap and salt.

The experience of PNS in this area to date suggests that unless there is an element of economic activity associated with these associations, membership would not find it interesting to stick together. Such economic activity, as has been belatedly recognized by DGF/PNS lies in marketing of agricultural produce and occasional purchase of day to day necessities and resale at the village level. It is commendable that this has been realized by DGF during last year.

In view of the fact that DGF works primarily with farmers helping them to organize for better marketing (or provide a joint front for better marketing practices such as weighing of produce etc.) and has limited resources in terms of field agents (10 animateurs) it is suggested that DGF be merged with R&V sub-system as a unit within the subsystem charged with organizing farmers associations. The other aspect of marketing (dealing with merchants) is mainly the function of sous-system de commercialisation. Since this sub-system is by and large active only during the period of corn marketing, it is suggested that this sub-system be eliminated and its personnel transferred to PMU as a separate unit like SCAD. In any event, PMU has a greater say in the matter of dealing with merchants, big and small. Merging commercialization sub-system with PMU would enhance coordination of various issues involved in dealing with merchants and would also add to the efficient use of resources.

An advantage of merging DGF with the research and extension sub-system would be to help the extension service in developing group processes and approaches. For example, in future, if it is decided to produce seed at village level, a compact area would be needed for seed production. Farmers councils and farmers association/groups could be useful in providing such a compact area and undertaking seed production activity on adjacent fields. DGF, as a part of extension could play a useful role in this. Further, it could expand its activities using extension agents without need to recruit additional personnel.

Approach: Single vs. Multiple Crops

To date the focus of extension service has been on the principal crop enterprise of the area, i.e., maize. However, there are other important food crops in the area such as kasava, peanuts, and beans. In Nyunzu sector kasava is the principal food crop and maize is the commercial crop. Cotton is yet another important commercial crop. Extension workers at the village level are generally unaware of either the peanut variety (introduced several years ago) and the cotton variety currently promoted by ESTAGRICO. Project Paper talks of farming systems and PNS claims credit for the increase in the quantities of peanuts and palm oil marketed from the area; while the PNS extension service is totally oblivious of other crops in the area. Farming in the PNS area is not a single crop enterprise. Farmers grow and have equally strong interest in other crops. Therefore, while emphasizing corn production, PNS extension service should have started promoting other crop technologies. Again, it seems to this evaluator that there was a lack of clarity of Project's objectives at the middle and lower levels of PNS extension service and failure of guidance from above.

If PNS is to be continued, PNS should start testing available crop technologies in kasava and peanuts, and start training its extension agents in multi-crop approach.

#### IV. TECHNICAL PACKAGE

Kasai-1 maize production package recommended by PNS consists of the following practices.

1. Improved seed - (Kasai 1)
2. Early sowing: (about Sept 15)
3. Line planting (75 cm x 50 cm; 3 plants per hill)
4. Thinning to two plants per hill
5. Two to three weeding before flowering
6. Optimum plant population, 53,000 plants/hectare as against 25-30,000 under local practice
7. Optimum time of harvest

Seed is the key element of the package. Kasai-1 was developed by Projet National du Mais (PNM - CIMMYT) and proved reasonably well adopted to the PNS area compared to other varieties tested in the area. It seems susceptible to yellow streak virus from the observations of the standing crop (2nd crop) both at the N'Gaba station and in the farmers fields. However, there is no serious concern expressed by farmers. The virus attack seems to be more in the second season than in the first season, which is the main season. Kasai-1 yields obtained in the demonstrations and its wide acceptance by farmers is an indication of the suitability of the variety to the PNS area, until a still superior variety could be found. The rest of the recommended practices are basically cultural practices with zero cash investment on the part of farmers except for additional time required for planting and weeding. Thus the recommended practices, do not constitute a risk on the part of farmers in the way use of fertilizers and pesticides would.

Package as currently recommended is a viable package, however, certain elements of the package would need further testing specially the elements relating to spacing and date of sowing. A question has often been raised in project related reports and documents about the suitability of Kasai-1 package (eg: "package is not suitable because it does not take into account traditional farming system;" "nature of potential risks to farmers in adopting this package" etc.). It is to be noted that introduction of new seed is not the same as replacing an existing crop or introducing a new crop which might affect the farming systems practiced in a locality. Maize is a traditional crop in the area and thus a part of the traditional cropping system. The only demand introduction of new seed might place on the farmer is that of extra time required for line sowing and weeding. Further, given the current set of recommended practices, it is difficult to see what the

potential risks are to farmers in adopting this package (except when poor quality seeds are supplied). Discussions with farmers and extension workers indicated that the resistance of farmers to line sowing is not so much due to the competing nature of demands on farmer's time by various crops<sup>1</sup>. But to a large extent this is due to behavioral changes required of the farmers. The argument about the demands on women's time does not seem to fully explain the resistance to line sowing and weeding given the relatively small area of cultivation, about 1.4 ha. in M'Bulula area and 2.5 ha. in Nyunzu area. In other African cultures, notably in west Africa, where weeding is a traditional practice (and often acts as a constraint on expanding cultivated area), demands on women's time are much more extensive (such as grinding millets, fetching water from long distances and collecting firewood from far-off places). Therefore, resistance to line sowing seems to be a question of behavioral changes among the farmers. Further, tradition of mai-mai consumption (palm liquor) does not seem to help the situation.

#### Adoption of Recommended Practices

1. Seed: It is our impression that Kasai-1 seed is widely accepted. It is no exaggeration to say that acceptance rate exceeds 50%. According to PNS report of 1980-81 55% of the area cultivated under maize is sown to Kasi-1. M'Bulula sector has a high acceptance rate.

2. Cultural Practices: There are varying levels of acceptance of cultural practices. Row planting is practiced on about 12% of the maize area (1980-81 report). Similarly, according to various estimates not more than 15% of the farmers practice weeding two times.<sup>2</sup>

According to a 1981 report,<sup>2</sup> of the households reached by the extension service, 15% of the households use full package of improved seeds and other practices. Additional 35% use one or more of the recommended practices (probably mainly the improved seed). (See Appendix A, table: 3). DAI report indicates somewhat higher rates of adoption for 1981 season (Appendix A: Table: 4). But the data for the two years is not comparable, since the two reports use different units (households vs. farmers). Certain farmers we have visited with seem to be using different spacing (75 x 60 cm) and number of seeds per hill (3 to 5).

It is clear from the information gathered in the field and project reports that the Kasai-1 package is not fully adopted by majority of farmers, for one reason or the other. Even though Kasai-1 seed has found wide acceptance, other practices are being accepted much slowly. This phenomena is not peculiar to North Shaba

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1 Two other crops in the PNS area during the first season are peanuts cultivated in very small area and manioc which is a long duration crop of 10-12 months.

2 These figures seem to be acceptable and reasonable compared with the findings of a research study conducted in a non-PNS village: see Appendix: 1 for details. (Terry Hardt's study).

farmers alone<sup>3</sup>. Experience world wide shows that no package, however proven has been adopted completely and it undergoes modification at farm level depending on farmers resources and behavioral readiness. Therefore it is utopia to expect total acceptance and adherence to a package. However, a key factor in the very low adoption rates of recommended cultural practices seem to be the inability of PNS extension service to demonstrate and communicate the advantages of recommended practices. Farmers in general tend not to perceive the impact of good cultural practices on yield levels and tend to attribute increased yield to seed only. In other words, cultural practices have low communicability. Hence PNS extension service should make vigorous efforts at breaking the perception - communication barrier in order to promote the adoption of cultural practices.

The reasons for lower acceptance of cultural practices need to be explored further. A key factor that needs to be explored is to what extent resistance to weeding (first crop of corn) is due to the competing labor demand for other crops and subsistence tasks, specially gathering of palm nuts and oil extractions. An alert and well supervised extension service (and of course SCAD) could have provided some answers to these questions.

Therefore, in summary, the following conclusions can be drawn regarding the nature of package.

1. The practices recommended are a set of viable and minimum risk interventions.
2. Yield increasing potential (upwards of 25%) has been demonstrated. (Appendix A, Tables 6 and 8)
3. Low level or rate of acceptance of certain elements of the package seem to be both due to behaviour changes needed and due to competing demands on family labor by other subsistence tasks.<sup>4</sup>
4. Greater efforts to educate the farmers about the advantage of certain practices (optimum plant population, crop-weed competition) as against just informing them (to sow in lines and weed thrice) are likely to result in higher acceptance rates.
5. The package proposed is within the resource structure of farmers.

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<sup>3</sup> Given the fact that package has been extended, only during the last four cropping seasons, poorly trained extension agents, the acceptance rates are similar to those observed in the developing countries. Note that, it took 14 years for hybrid corn varieties to be adopted by Iowa farmers.

Seed Distribution

Seed is the main element of Kasai-1 package. Yet PNS has not developed a program of seed production and distribution in the area. Efficiency of extension service had been adversely affected by lack of concern at PNS in this regard.

In 1980 seed production was organized on selected farmers fields. Yet when the farmers were ready to sell the seeds, PNS was unable to purchase the seed and thus farmers either consumed or marketed the seed as grain. In 1981, PNS purchased seed from private producers and transported to project area (about 54 tons). The cost of seed including transportation was so high (5 Z/kg) that farmers were unwilling to pay such a high price. The cost of seed and delay in the arrival of seed, resulted in the sale of just about 4 tons. Till today about 50 tons of seed lies unsold in the PNS warehouses. The result: there has been hardly any infusion of new seed into the area during the last two seasons. The seed in the farmers hands at present is about 3 years old supplied in 1978 and 1979 seasons.

PNS could have organized seed production at N'Gaba station and thus produced seed and made available to the farmers at a much lower cost (we were told that during 1981 season some seed was produced which could be distributed in the 1982 season).

If the project is to continue and make impact on the overall maize production in the area, organization of seed production and distribution should receive top priority. Without this PNS technical package has no meaning.

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<sup>4</sup> Lee Hardt study (1981) indicates that in half or more than half the cases men and women together performed 1st (56%) and 2nd weeding (50%) operations. Hence the idea of competing labor demand for agricultural vs homemaking-subsistence activities does not explain fully the resistance to weeding practices.

## V. TRAINING OF EXTENSION PERSONNEL

### Current Status of Training:

PNS recruits from the group of trainees graduating from agricultural schools called as "Ecole Technique Agricole". One such school from which majority of PNS extension agents were recruited is located at Kaseya, about 35 km from PNS HQ at Kongolo. Trainees enter the training school after primary school (6 years) and receive training during a four year period. Training consists of general education and technical agriculture. Most trainees come from within the PNS area and belong to rural households. PNS administers a test to select the best among the graduating class. Those who pass the test join PNS as village level extension agents. Once selected the agents are given one month training (mostly in agricultural theory) and assigned to the agricultural centers (Centre Agricole). On the job training is provided (in theory) by their immediate supervisors. In addition to on the job training, extension agents are expected to receive training every year (recyclage or refresh training) to improve their skills and agricultural knowledge.

A look at the quality of training offered at the agricultural schools would be informative. The impressions about the quality of training offered at the agricultural school are based on one visit to the training center and discussions held with the director of the Ecole Technique Agricole (Prefet). The school has more than adequate physical facilities, buildings and a farm. The quality of training offered is very poor. The instructors are not acquainted with the current state of art relating to the technologies of the major crops in the area. Also they have not received any further training since their graduation. The school is devoid of any teaching resources such as books, equipment etc. Students are hardly given any training in extension methodology, skills of communication; and dealing with farmers. Curriculum stresses basic education and elementary agriculture. Minimum amount of time is spent in practical training. Thus it is no exaggeration to say that at graduation the trainees or agents recruited by PNS totally lack basic competencies required of extension agents such as technical, extension-communication and analytical competencies. Thus the critical importance of training at PNS once the agents are recruited.

### Training to date at PNS:

In addition to giving one month training to extension agents before assigning them to agricultural centers, PNS to date has conducted two training

sessions lasting about three weeks during each of the years 1980 and 1981. No written record exists of the content of training nor the impact of training process on the knowledge and skills of extension agents. However, inquiries revealed two foci of training. They were: information about crop technologies (maize, peanuts) and training in extension methodologies. It was not possible to evaluate the quality or comprehensiveness of training in the absence of any written evidence. Absence of physical facilities and personnel to date (as of May '82 training facilities are nearing completion) makes it difficult to accept the claims made in regard to training. In the opinion of this evaluator, even in the absence of formal training facilities at N'Gaba station PNS could have conducted specific problem oriented training for its agents. The agents in each sector could have been assembled in one of the villages, using the village school as a place of training, and one or two day problem oriented, intensive training program could have been conducted by charge' de vulgarisation, Director of PNS and one or two experts invited from PNM or other relevant organizations (PRONAM, ESTAGRICO, etc.). Thus 3 training sessions (first one before planting, second before mid point in the cropping season and third before the harvest could have raised the quality of extension work in the PNS area. (A similar training is conducted by ESTAGRICO for its field agents). Resources of PNS past and present would have been more than enough to conduct this type of training. In all fairness, it is to be pointed out that, head of the Research and Extension sub-system and the three charge' de vulgarisation have been found to be very competent and knowledgeable persons. Their knowledge of technical agriculture and extensions methodology was impressive. However, they needed higher direction and guidance. Clearly head of the R&E sub-system was overburdened with overseeing the whole R&E efforts and he had little time left to guide and supervise sector and zonal level personnel. It is no exaggeration to say that only with <sup>single</sup> A3 level research assistant he was struggling to bear the burden of research effort at N'Gaba. Further, several of TDY experts, their conflicting and inconsistent advice often based on partial understanding of local agricultural conditions, did not make easy the job of R&E subsystem chief. There was no person in PNS, either expatriate or local, to provide inputs into the type of training needed for PNS agents. I cannot help marking that it is yet again the failure of higher levels of the PNS to assess the staffing needs at R&E subsystem so that R&E system fulfills its responsibilities.

Another output expected of the extension component of R&V subsystem was the training of 75 para professionals. This was not done till to date. Again, PNS extension organization could have identified certain farmers (farmers known as good farmers; members of farmers councils) in each of the sectors and conducted training sessions in a centrally located village. Three half a day sessions spread out during the cropping period at appropriate terms, would have improved the quality of extension work, provided feed back to the extension agents and improved the rapport of the extension agents with farming community. Such training would have hardly required any resources and would have been right at the door step of the farmers and their families.

N'Gaba, research and extension center has been operational, for the last two years, (at least in a limited way). The station should have served as a point from which new ideas diffuse and radiate into the neighboring farming communities. This means that in addition to various trials and experiments conducted on the station, reasonably large fields of at least 1 hectare should have been laid out using recommended practices, to serve as demonstrations. Field days should have been organized by inviting farmers from neighboring villages to visit the center to observe the various crops. Transportation could have been arranged to enable the farmers to come to the center to observe various crops grown at the center. If nothing else such a step could have greatly contributed to the breaking down of barriers between PNS and the farmers improved the dialogue between PNS and farmers and increased the level of rapport between extension agent, researchers and farmers. Experience in other countries has time and again proved the beneficial effects of such an approach. Unfortunately this was not done at N'Gaba and a valuable opportunity was missed (apparently waiting for the construction of the buildings).

#### Potential Uses of N'Gaba Center

N'Gaba research and training center, nearing completion, is ambitious and somewhat above the requirements (present and immediate future) of a project like PNS. The center has following accommodations:

1. Lodging for at least 32 to 64 trainees (2 to 3 trainees/room)
2. Three class rooms
3. 1 Conference room
4. 4 residential units for trainees
5. Offices for the research and adm personnel
6. Laboratory
7. Large store
8. Workshop and garage

Inspite of the huge sums spent on the construction of training center (over half million dollars), organization and layout of the center betrays lack of planning and foresight. At the time of our visit no responsible persons at PNS, either local or expatriate has indicated specific plans for the operation and use of the center constructed at such a huge cost. Ideas about uses of the training center are mostly in the minds of people and nowhere exists a definite or tentative written plan of training. One often hears of farmers training at the center. According to this plan farmers and their wives are to be brought to the center for 2-3 month training during the cropping season. This notion is totally impracticable, since no farmer could be induced to leave his crops and family (at least one wife and children) behind. Further such a program is fraught with logistic and other difficulties. Therefore, this idea of training farmers at N'Gaba should be abandoned. It has not proved successful anywhere in the developing world and there is no reason to believe that it would anything but be an exercise in futility.

Potential uses of N'Gaba training center are enumerated below:

1. Training of PNS extension staff:

Every year between July 1 and Aug 15, before the Agricultural season begins training courses should be held for all the extension staff (4-5 weeks).

This period of training should include among others the following:

Technical subject matter

Extension methodology

Review of past years program and lessons learned.

Experts and knowledgeable persons available in the PNS area from other agencies and a few from relevant research organizations should be invited to participate in training sessions.

2. Training of SCAD Personnel:

The center could plan one week sessions for SCAD personnel, to train them in interview techniques, data collection and observation techniques and data analysis. A few extension agents at a time could be associated with this training and over a period of time all extension agents should be recycled thru this training.

3. Annual Research Seminar:

PNS, R&E, Subsystem could organize a research workshop every year to review the research results obtained during the year and to plan the research for the following year. This could be a 3-4 day conference, involving both researchers and extension workers. Selected researchers could be invited from INERA and other

research organizations to serve as resource persons and provide inputs. Participation of extension workers would provide a meaningful approach to research problems existing in the area.

4. Rural development conference:

For lack of better title the phrase rural development conference is used. Any other suitable term could be employed. In this type of conference the basic idea is to bring together rural development practitioners (such as PNS leaders and staff) and key clientele of PNS activities. (Key farmers or farmers representatives; small and large merchants; school teachers and local businessman). The two groups (PNS staff and clientele groups) could discuss mutual problems (eg: issues in marketing between merchants and farmers, how can merchants meet farmers needs of consumer goods; how best marketing process be improved, etc.) Similarly, farmers can raise questions about the services rendered by extension service. In such a conference DGF and Extension service should play an important role. Such a conference would also provide valuable feed back to an organization like PNS about the problems, probable solutions and programs.

5. Participation of other agencies:

National research agencies dealing with area crops (PNM, PRONAM, INERA) should be requested to use the N'Gaba facilities to conduct trials or to test the adoption of their recommendations to the North Shaba area. A prerequisite is a qualified Zairian staff at N'Gaba, through whom above organizations could conduct trials (as opposed to having their own staffs).

ESTAGRICO should be invited to lay out cotton demonstrations/trials on the farm, so that farmers could observe cotton technology.

Staffing at N'Gaba Station

N'Gaba Research and Extension center does not have any staff (except head of research and extension subsystem and a single A3 level technician to assist him in research) at present. Again it has been the failure of project leadership not to think through and plan for the operation of the center. How could one person supervise a large extension service and conduct research? Irrespective of the presence of expatriate advisors, USAID, by virtue of having invested a huge amount in the construction of the center, should ensure that at least two qualified agronomists (A0 level) and 4 assistants (3 additional) are assigned to the station to conduct adoptive research trials under the direction of national agencies mentioned above.

Similarly a A1 level technician, with experience in extension should be assigned to take charge of the training program at N'Gaba center. A0 level researchers and A1, technicians identified above should work under the chief of Research and Extension subsystem for effective coordination of research and extension effort either in PNS or similar project.

## VI. FINDINGS AND RECOMMENDATIONS

### Accomplishments and Failures:

#### 1. Extension Organization:

Extension component has made considerable progress in establishing an extension organization capable of reaching and communicating with farmers. Through 60 village centers it is reaching 50% of the households in PNS area. For the first time, PNS farmers are able to dialogue with a development agency and receive at least some technical assistance. PNS has been able to inculcate a philosophy of development based on the principles of democracy, voluntarism and education. This is a sharp departure from the authoritarian approach commonly attributed to the two other agencies in the area (DOA and ESTAGRICO). The fact that farmers are willing to sit, talk, complain and praise (when it is due) is a considerable achievement given the background and approach of the traditional agencies in the area. In terms of coverage (reaching slightly over 50% of farm households in the area) and the number of farm centers established (60), progress has been satisfactory. The morale of extension agents is generally high.

While PNS extension service has achieved a certain degree of success there are serious deficiencies in its approach (methodology), very poor supervision of field agents compounded by lack of skills among the field agents (technological, communication and analytical competencies). Attention to these problems could have made the extension service much more effective. Extension agents primarily depend on persuasion and to a very limited extent on demonstrations to convince the farmers about the profitability of recommended practices. Very few demonstrations have been laid out on

farmers fields (12 in 1979, 15 in 1980 and none in 1981). In a tradition-bound society (such as PNS farming community) group approaches could be very useful. PNS extension service has never tried group approaches. Generally, there has been a very poor supervision of field agents, thus, very little on-the-job training of agents has taken place. There are no records maintained by a field agent. Reporting by the agents is rather unknown. There is a total absence of feedback from the field, either on problems or progress or suggested solutions. No written instructions are available with the field agents about the recommended practices. Lack of written instructions is among the main reasons for lack of understanding or even differential inter-preparation of the Package by certain field agents.

2. Adoption of Kasai-I Package:

Impact of extension on the acceptance of recommended practices, and thus on corn production is not insignificant. At present, about 50% of the farmers are using improved seed and about a third (15%) of whom are using full package and the rest (35%) are using one or more of the recommended practices (See Table 3 and 4). From the impressions gained from the visits to fields and discussions with farmers, it seems that about 20-25% of those using seed are also using one or more of the recommended practices. Given the fact that the project did not really get off the ground until late in the planting 1978 season (four cropping seasons at best), rate of adoption of recommended practices has been satisfactory. (Note that it took Iowa farmers 14 years to adopt hybrid corn.)

Table 5: Extent of Area Cultivated in PNS<sup>1</sup>

<u>Sector</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>
Kongolo	838	2,100	5,230	5,431
M'Bulula	1,540	2,341	3,497	4,365
Nyunzu	<u>2,295</u>	<u>3,329</u>	<u>6,143</u>	<u>6,943</u>
TOTAL	4,673	7,770	14,970	16,739

Reasons for the high acceptance of maize seed are obvious. According to the yield data available, Kasai-I yields surpass that of local variety. Farmers were in agreement about higher yields of Kasai-I. PNS has made no attempt to study or analyse the reasons for the low acceptance of the cultural practices. Low adoption seems to be due to one or more of the following reasons. Firstly, it is behavioral. That is, line sowing and weeding (2-3 times) involve learning of new behavior and work habits. Traditionally, farmers do not weed. Planting is done at random. Secondly, farmers in the developing countries tend to attribute increased yields to the seed only. Influence of other cultural practices on the yield is not communicated/easily. Hence, the importance of developing a good demonstration program. PNS extension staff tended to inform the farmers rather than explain and educate the farmers in the reasons for line sowing (optimum plant population, etc.), and weeding (eliminating or reducing plant competition (To do this, extension agents need technical skills and communication skills in dealing with the farmers.)). Third reason for low adoption of cultural practices seems to be the possibility of competing demands on farm families labor<sup>a</sup> required for other crops and subsistence activities of homemaking, corn pounding, collection of palm nuts and palm oil processing. Extension workers did not have proper training to observe these factors. Neither SCAD nor the research component (farming systems) provided enough support to extension on this aspect.

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a: The prevailing notion of weeding as the main responsibility of women is not borne out by research in the PNS area (see Lee Hardt and Blakley studies). Further, the notion of lack of time due to subsistence activities does not fully explain low adoption of cultural practices. In other African cultures (West Africa), where women's tasks are equally laborious, weeding is a traditional practice.

Partial acceptance of Kasai-I Package is not something peculiar to this area. In general, most packages undergo modifications at farm level depending on the farmer's resources and his ability to take risk. Kasai-I package is a viable, and a minimum risk package and certainly within the resources of farmers. What has been lacking is effective extension approach to promote the package. An important problem in sustaining the Kasai-I Package has been the inability of PNS to develop a program of seed production and distribution. The seed available with the farmers is 2 to 3 years old and thus might have lost, considerably the genetic purity.

### 3. Extension Training:

Very little extension training has been conducted to date. Two to three week training session have been conducted during July of 1980 and 1981. No written records of training exist. Hence, it is difficult to comment on the quality or content of training offered. Due to poor supervision, very little on-the-job training has occurred. Annual orientation training and on-the-job training by supervisors was very essential in view of the inadequate pre-service training (both in quality and content) received by PNS field agents.

Farmer training was not conducted to date. PNS officials indicated that once construction of N'Gaba station is completed, farmers' training will commence. Farmers would be brought to N'Gaba station for 2-3 months during the season for training. This seems impracticable. Farmers' training should only be conducted in the villages with occasional field days conducted at N'Gaba center.

4. There has been no perceivable linkage between PNS extension service and the other extension agencies in the area (DOA and ESTAGRICO). Very limited efforts have been made to develop linkages between the agencies. The possibilities of coordination and linkages with DOA and ultimate integration were not pursued. Incidentally, this would have served as a model and example for replicating in other regions of the country. In fact, the possibility of linkage and integration was one of the key elements of replicability in the Project.

5. There has been no research support to the PNS extension program, because of the problems of initiating and sustaining applied research program at N'Gaba station. Therefore, the strength of relationship between trial stations and farm centers cannot be evaluated. The only applied research activity that took place during the four years was the one dealing with the so-called diamond trials and Kasai-I Package trials with fertilizers. These trials were conducted on farmers' fields by researchers in cooperation with extension agents.

6. Technical Assistance:

Problems of providing technical assistance in research had also affected the overall performance of extension. Short-term technical assistance provided in extension did not address the main issues involved in strengthening the performance of extension (extension methodology, training and supervision).

## Recommendations

In view of the overall performance of the PNS project to date two alternate recommendations are presented.

### First option:

Keeping in view the progress made by PNS extension service, it is recommended that PNS extension component should continue until the end of the phase out period. PNS extension service should use this period as a consolidating period and not expand its activities geographically. During this period USAID should examine with Govt. of Zaire, various means of integrating PNS extension personnel into DOA. During this period PNS should concentrate on improving the existing organization by improving the methods and processes. If this aim seems feasible (integration and strengthening) and should require several additional months of AID financing to accomplish, USAID should consider doing so. Suggestions for improvement are indicated below:

- i) Organize training for extension agents in July. Topics should include (1) Maize and other important crops - Cassava (manioc), Peanuts, Cotton; (2) Extension Methodology: how to approach the farmer; how to conduct demonstrations and group discussions.
- ii) Each extension agent should conduct at least two demonstrations in his area.
- iii) 4-plot demonstration design should be dropped in favor of simple two-plot design using improved seed with recommended practices vs. local seed with traditional practices.
- iv) Initiate farmers' training in centers with low adoption rates. Three half-day sessions should be conducted at selected villages to which farmers from neighboring villages should be invited. (1st session: early September before planting, 2nd session: 6 weeks after planting, 3rd session: after flowering). This training could be conducted by charge' de vulgarisation (3), assistant, and the field agent.
- v) Prepare written instructions on recommended practices (fiche technique) which should be given to each extension agent. Prepare written instructions in Swahili to be distributed among literate farmers. This could be achieved at a very low cost.
- vi) Prepare a demonstration booklet (record book). Extension workers should maintain a record of each demonstration conducted with entries relating to planting date, size of field, recommended practices followed, observations on incidence of pests and diseases, germination

plant count, dates of weedings, date of first flowering, date of harvest and yield.

- vii) PNS should take immediate steps to supply Kasai-1 seeds during the coming season (August-September 1982).
- Shell, clean and pack into 25 kg bags (recommended rate) Kasai -1 seed on cob at present remaining unshelled at N'Gaba.
  - Sample the seed and obtain germination tests on the previous year's seed remaining in storage at N'Gaba. (Samples should be drawn after cleaning). If test results are at least 75% or more, only then release seed for distribution.

Second option:

If the project is extended or decision made to continue USAID's presence in North Shaba beyond September 1983, then project should be completely redesigned, with realistically defined purposes and goals, and reduced in terms of sub-systems to bring about greater cost effectiveness.

The redesign should take the following suggestions into consideration:

- i) define clearly and realistically project goals and purposes;
- ii) identify which sub-systems should be continued, which should be merged and which should be eliminated;
- iii) indicate clearly the role of each sub-system and linkages between sub-systems.

From the present experience and study, the following would seem justified.

- a) Continue PMU with better managerial and decision-making capacity, with SCAD revitalized to gather better quality data, useable and timely reports. Merge credit and commercialization (C&C) with PMU<sup>1</sup> (designate as a unit under PMU like SCAD). C&C primarily deals with a handful of merchants and its credit program is worthless. Merging C&C with PMU, would bring much needed economies in the PNS (separate vehicle, staff, etc.). In any case, dealing with merchants needs much more input and decision-making from PMU.
- b) Continue the infrastructure sub-system
- c) Eliminate intermediate technology. Its support to increased corn

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<sup>1</sup> This mode of merging (Credit-Commercialization with PMU and DGF with R&E) is suggested to avoid the inherent conflict that would result from the same people (or unit) dealing with farmers and merchants in maize marketing, if DGF and Commercialization are merged in a redesign project, as suggested elsewhere in the evaluation.

production has been negligible. Merge the equipment with the infrastructure sub-system. Simultaneously private enterprise should be encouraged to supply substantively better quality tools.

- d) Continue research and extension sub-system and provide with two technical advisors: agronomy and extension.
- e) Eliminate DGF sub-system and merge it with research and extension sub-system as a unit within the system. DGF primarily deals with farmers (and women). Its limited achievement to date has been in organizing farmer's groups to market their corn. DGF is ill-equipped to provide any content for farmers councils and interpret feedback from these councils. This they can only do in conjunction with extension. Therefore, they would be better placed as a part of extension. Further, DGF should not expand beyond its current size and area until it really develops a process and method of organizing farmer's groups to plan and execute basic economic activities. Thus, the merged DGF should concentrate basically on two things: 1) Continue to organize farmers groups for economic activities; and 2) Continue to organize and work with farmers councils for broader project purposes (developing group approaches needed by extension workers).

#### Recommendations for extension component in a redesigned project

##### Organization:

1. Continue research and extension activities in the same sub-system for better coordination of research and extension.
2. Current structure of organization - 4 levels - is adequate - if quality of supervision, and training are improved.

##### Staffing:

3. Provide expatriate technical assistance in the form of a long term advisor to assist in developing training programs, extension methodology and effective supervisory practices.
4. Provide a Zairian technician of A1 or A0 level (with experience in extension) to work at N'Gaba station to design and implement training programs.

Training:

5. Zairian supervisors at sector and zone levels should be trained in supervision of extension agents.
6. Interservice training program of at least 3-4 weeks should be organized every year for extension agents. Content should include crop technologies and extension methodology, methods of observations etc. Detailed written training plans should be developed on the basis of need assessment.
7. Farmers training should be conducted at the village level shortly before the planting season, during the crop growth period and before harvest. Three half-a-day sessions would seem sufficient. A village should be chosen as a center and farmers from the neighboring villages must be invited to participate in these sessions (include women if customs and conditions permit).
8. Animatrices should be given short training in crop technologies or recommended practices to make their work with women effective.

Extension Methodology

9. Every village agent should be provided with written instructions about the practices being promoted.
10. Multi-crop approach should be used instead of single crop approach.
11. Every extension worker should be required to conduct at least two to three demonstrations on farmers fields.
12. A system of record keeping should be developed for each extension agent. A separate record should be maintained for each village.
13. An overall annual plan of extension activities should be drawn up before the planting season identifying specific activities requirements of supplies etc.
14. Quarterly meetings should be held separately for each sector for review of program and problems. Feed back from extension agents must be solicited actively on problems and needed solutions.
15. Coordination between agencies in the area should be developed to mutually reinforce the activities.
16. Provide the field agents with (a) technical literature on production techniques of relevant crops (such as booklets produced by I.I.T.A. on maize and cow-pea. (b) Basic equipment to measure demonstration plots and weighing produce from demonstration plots.

Overall Impact of PNS (Observations and Comments)

From the visit to project site and from the data supplied by PNS the following observations could be made.

1. There has been an increased production, resulting in a marketable surplus in the area (maize exports from the area). (Could be attributed both to PNS and external factors).
2. A development process has been initiated in the form of an organization to reach even isolated villages with technology.
3. There seems to be more affluence and economic activity in the area. It could be both due to the PNS payroll and due to the increased income generated by increased maize production.
4. Opening of roads and access to markets has contributed to increased production of maize (and perhaps other products) and increased flow of consumer goods into the villages.
5. An indicator of increased income and aspirations (and thus of development)-- reported by farmers, merchants and PNS staff -- has been the demand by farmers for high cost consumer goods such as bicycles, sewing machines, radios and galvanized iron sheets for roofing.

However, we cannot help asking the following questions. At what monetary cost has this been achieved? Is the process replicable and sustainable in the long run. The answer to the first question is that the huge cost is not commensurate with the limited overall success. Secondly it does not seem to be replicable, if cost is any consideration, and the project has been unable to develop appropriate rural development processes. Sustainability of the project (meaning, maintenance of roads by GOZ private initiative, extension service to be financed by farmers and merchants, etc.); seems to be impossible. In the absence of continued foreign assistance, the GOZ is unable to finance rural development projects. However, certain elements of the project, (infrastructure and research and extension) seem sustainable with much lower levels of foreign assistance and current levels of contributions from the GOZ.

## PROJECT NORTH SHABA EVALUATION

### SUMMARY OF MAIN RECOMMENDATIONS

#### EXTENSION COMPONENT

##### First Option :

PNS Extension component should continue until the end of the phase out period. During this period USAID should examine various means of integrating PNS extension service with DOA. This period should be used as a strengthening and consolidating period and not to expand its activities geographically. If this aim seems faisible (integrating and strenthening) and should require several additional months of AID financing to accomplish, USADI should consider doing so. PNS should concentrate on improving the existing organization by improving its methods and processes. Details are suggested below.

- ii) Organize training for extension agents in July. Topics should include (1) maize and other important crops - kasava, peanuts, cotton; (2) extension methodology: how to approach the farmer; how to conduct demonstrations and group discussions.
- iii) Each extension agent should conduct at least two demonstrations in his area.
- iv) 4-plot demonstration design should be dropped in favor of simple two)plot design using improved seed with recommended practices vs. local seed with traditional practices.
- v) Initiate farmers' training in centers with low adoption rates. Three half-day sessions should

be conducted at selected villages to which farmers from neighboring village should be invited. (1st session: early September before planting, 2nd session: 6 weeks after planting, 3rd session: after flowering). This training could be conducted by chargé de vulgarisation, assistant, and the field agent.

- vi) Prepare written instructions on recommended practices (fische technique) which should be given to each extension agent. Prepare written instructions in Swahili to be distributed among literate farmers. This could be achieved at a very low cost.
- vii) Prepare a demonstration booklet (record book). Extension workers should maintain a record of each demonstration conducted with entries relating to planting date, size of field, recommended practices followed, observations on incidence of pests and diseases, germination, plant count, date of weeding, date of first flowering, date of harvest and yield.
- viii) PNS should take immediate steps to supply Kasai-I seeds during the coming season (August-September 1982).
  - : Shell, clean and pack into 25 kg bags (recommended rate) Kasai-I seed on cob at present remaining unshelled at Ngaba.
  - : Sample the seed and obtain germination tests on the previous year's seed remaining in storage at Ngaba. (Samples should be drawn after cleaning). If test results are at least 75% or more, only then release seed for distribution.

#### Second Option:

If the Project is extended or decision made to continue USAID's presence in North Shaba beyond September 1983, then Project should be completely redesigned, with realistically defined purposes and goals, and reduced in terms of sub-systems

to bring about greater cost effectiveness.

The dedesign should take the following suggestions into consideration :

- i) define clearly and realistically Project goals and purposes;
- ii) identify which sub-systems should be continued, which should be merged and which should be eliminated
- iii) define sharply the role of each sub-system and linkages between sub-systems.

From the present experience and study, the following would seem justified :

- a) Continue PMU with better managerial and decision-making capacity, with SCAD revitalized to gather better quality data and prepare useable and timely reports. Merge credit and commercialisation (C&C) with PMU<sup>1</sup> (designate as a unit under PMU like SCAD). C&C primarily deals with a handful of merchamercants and its credit program is non-existent. Merging C&C with PMU, would bring much needed economies in the PNS (separate vehicle, staff, etc.). In any case, dealing with merchants needs much more input and decision-making from PMU.
- b) Continue the infrastructure sub-system.
- c) Eliminate intermediate technology. Its support to increased corn production has been negligible.

1. This mode of merging (Credit-Commercialisation with PMU and DGF with R&V) is suggested to avoid the inherent conflict that would result from the same people (or unit) dealing with farmers and merchants in maize marketing.

Merge the equipment with infrastructure sub-system or repair shop. Elimination would also boost the private enterprise supplying substantively better tools.

- d) Continue R&V sub-system and provide with two technical advisors: agronomy and extension.
- e) Eliminate DGF sub-system and merge it with R&V sub-system as a unit within R&V. DGF primarily deals with farmers (and women). Its limited achievement to date has been in organizing farmer's groups to market their corn. DGF is ill-equipped to provide any content for farmer's councils and interpret feedback from these councils. This they can only do in conjunction with extension. Therefore, they would be better placed as a part of extension. Further, DGF should not expand beyond its current size and area until it really develops a process and method of organizing farmer's groups to plan and execute basic economic activities. Thus, the merged DGF should concentrate basically on two things: 1) continue to organize farmer's groups for economic activities; and 2) continue to organize and work with farmers councils for broader project purposes (developing group approaches needed by extension workers).

APPENDIX: A

DATA TABLES

PNS EXTENSION SERVICE

Table 1: Organization of PNS Extension Service (April 1982)

No. of Sectors	:	3	(Kongolo, M'Bulula, Nyunzu)		
No. of Zones	:	10	4	5	3
No. of Village Centers: (80% of 1983 target)	:	60	22	25	13
No. of Villages/Center:	:	3-5			
No. of Farmers/Agent	:	Approx. 200			

Table 2: Extent of Coverage<sup>1</sup> (No. of Households<sup>2</sup>)

<u>Sector</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>
Kongolo	1,124	2,806	4,582	5,554
M'Bulula	1,749	2,938	4,017	4,205
Nyunzu	922	1,613	2,484	3,074
TOTAL	3,795	7,357	11,083	12,833

1: Source: Project North Shaba: Annual Report

2: Total number of ag. households in PNS area - 25,561, and a total population of 166,054. (Source: Bref Appercu Sur les Activités du PNS, March 31, 1982.)

Table 3: No. of Households Using Recommended Practices (1980-81)

No. Using Full Package	:	1753 or 16%
No. Using One or More Practices:	:	4,280 or 38.5%
No. Using Traditional Practices:	:	5,050 or 45.5%

Source: PNS Annual Report, 1980-81.

Table 4: Number of Farmers Using Recommended Practices<sup>1</sup>

	<u>1980-81</u>	<u>1981-82</u>	<u>Remarks</u>
No. Using Seed	6,033	9,589	80% of 1983 Target
No. Using One or More Improved Practices	1,753	3,705	62% of 1983 Target

1: Source: Five Years Later Progress and Sustainability in Project North Shaba, DAI, March, 1982, P. V-8. (Note that these are number of farmers. It is possible that each household could have more than one farmer.)

Table 5: Extent of Area Cultivated in PNS<sup>1</sup>

<u>Sector</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>
Kongolo	838	2,100	5,230	5,431
M'Bulula	1,540	2,341	3,497	4,365
Nyunzu	<u>2,295</u>	<u>3,329</u>	<u>6,143</u>	<u>6,943</u>
TOTAL	4,673	7,770	14,970	16,739

1: Source: Project North Shaba: Annual Report 1981-82.

Table 6: Demonstration Results: Kasai-I Package (kgs/hectare)<sup>x</sup>

	<u>1979-80</u> (15 Locations)	<u>1980-81</u> (12 Locations)
Improved Seed & Recommended Practices	4,203	3,503
Improved Seed & Traditional Practices	2,123	2,641
Local Seed & Recommended Practices	2,727	2,351
Local Seed & Traditional Practices	1,434	1,881

x: No Fertilizers. Source: SCAD, 1980 data, Maximum yield 1980-81, 4,176 at Lengwe.

Table 7: Corn Exports From Project Area 1977-81

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Price/M. Ton	Z10	Z22	Z35	Z45	Z60
Kongolo	1,099	1,516.5	1,908	3,656	5,853
Nyunzu	<u>4,805</u>	<u>10,118.5</u>	<u>10,445</u>	<u>14,542.5</u>	<u>26,530</u>
TOTAL	5,904	11,635	12,353	18,122	32,383

Source: Five Years Later Progress and Sustainability in Project North Shaba, DAI, March, 1982. (Note that PNS really started its activities in 1979 and hence 1978 should be considered as the base year to judge the impact on production. See Page V-12 of DAI Report.)

Table 8: Average Yields of Improved and Local Varieties of Maize in PNS Area (kg/hectare)

<u>Sector</u>	<u>Improved Variety</u>		<u>Local Variety</u>	
	<u>Forest</u>	<u>Savanna</u>	<u>Forest</u>	<u>Savanna</u>
Kongolo	1.691	1.234	1.398	1.147
M'Bulula	1.786	1.420	1.00	.950
Nyunzu	2,498	768	1,685	.795

Source: Project Nord-Shaba, Rapport Annuel 1979-80.

## APPENDIX: B

A research study (Terry Lee Hardt, 1979) conducted in a non-PNS area observed the following:

- 1) 22 out of 100 farmers had knowledge of the variety Kasai-I (22%).
- 2) 13 out of 22 had received information from PNS employees and 9 from friends and relatives.
- 3) Of those who had knowledge of the variety, 18 heard of it in 1978, 9 in 1979, 4 in 1980 first season, and 1 in 1980 second season.
- 4) 19 out of 22 indicated that at least one person in their household was using the variety (86.36%).
- 5) 15 out of the 19 households indicated that the household head had first planted the seeds.
- 6) Following findings were indicated about the extent of coverage:
  - 3 out of 19 planted new variety in all their fields (15.78%)
  - 4 of the 19 planted new variety in half or more of the area (21.05%)
  - 12 of the 19 planted a small amount of new variety (63.15%).
- 7) Impact on number and size of fields planted:
  - 5 out of 19 planted more fields than before
  - 8 out of 19 planted larger fields than before
  - 12 out of the 19 planting some of the new variety, planted more maize
  - 6 of the 19 reported selling more maize than before.

APPENDIX: C

LIST OF DOCUMENTS CONSULTED

1. Project Paper: North Shaba Project, 1976.
2. Revised Project Paper: North Shaba Project (August 1980)
3. Dimpex Report: Evaluation of the North Shaba Integrated Rural Development Project: 1979.
4. DAI: Internal Evaluation of Project North Shaba, November 1980.
5. DAI Report: Five Years Later: Progress and Sustainability in Project North Shaba, March 1980.
6. Blakely Report: Case Studies of Selected North Shaba Project "Farmers' Centers. (March 1979)
7. Terry Lee Hardt: "Decision-Making Roles in the Rural Household and the Adoption and Diffusion of an Improved Maize Variety in Northern Shaba Province". Ph.D. dissertation, Iowa State University, Ames, Iowa, 1981, p. 63,64,66,67 ( p. 47 (Du 2. Ag. labor)
8. Guide du Visiteur au Project North Shaba, s/s de R&V., 1981.
9. Resumé des Activites des Recherches et de Vulgarisation du P.N.S., Premier Rapport, trimestriel, 1981.
10. Annual Report, Project North Shaba, 1980-81.
11. Annual Report, Project North Shaba, 1979-80.
12. Project North Shaba 1980-81, End of Tour Report (Merrit-Sargent, COP, 12/31/81).
13. Rapport d'une Mission d'Agronome et de Vulgarisation Agricole, Effecture au PNS, Zaire, du 27 juillet au 27 Aout '1980. (Donal Humphal & F. Regier).
14. Bref Apercu sur les Activites du PNS: 31 Mars, 1982.
15. Grain Storage in Project North Shaba: Loss Assessment, Analysis, and Recommendations (Roger W. Vinisa, Appropriate Technology/Grain Storage Consultant, DAI, no date)
16. Manioc Potential for Project North Shaba. S. J. Pandey, Project National Manioc, INERA/M'VUAZI, Gare MWEKE, BAS ZAIRE, 12 April 1982.

17. Evaluation de L'Occurrence et L'Impact des Maladies Phythopathologiques Dans la Zone du Projet Shaba Nord (B. E. Lockhart, TDY Consultant, DAI, July 1980)
18. Evaluation de L'Occurrence et de L'Impact des Maladies Phytopathologiques Dans la Zone du Projet Nord Shaba, II (B. E. Lockhart, TDY Consultant, DAI, December 1980)

APPENDIX: D

List of Persons Contacted & Places Visited

A. PNS Personnel:

1. Cit. Matiso, Director, PNS
2. Cit. Mbuyi Lusambo, Chef de Section, Kongolo
3. Cit. Kasungu, Chef de Section, M'Bulula
4. Cit. Esul Ngandu, Chef de Section, Nyunzu
5. Cit. Nyagashendi Gakwavu, SCAD
6. Cit. Kaziyama, Chef, SS, DGF
7. Cit. Baziki, Animateur, Sector M'Bulula
8. Cit. Muama Wa Milumbu, Agronome-Vulgarisateur (Pendé)
9. Cit. Nasibu, Assistant de Vulgarization, Nyunzu
10. Cit. Gazimba, Rapporteur Principal, SCAD, Nyunzu
11. Cit. Useini, Chef Sous-System, Recherch et Vulgarization
12. Cit. Kafunda, Chef Sector, (DOA), Agronome de Zone
13. Cit. Kaniyama Kassé, Project Seed Multiplication
14. Cit. Cherumé, Director, CENECOF

B. Other Agencies:

1. M. Decock Francais, Agronome, ESTAGRICO
2. Cit. Kafunda, Chef, Agronome de Zone (DOA), Nyunzu
3. Chef, Agronome de Zone (DOA), Kongolo
4. Cit. Lubangi, Prefet, Ecole de Kaseya
5. Father Antonio: Kivu Sola, Missionary Farm
6. Kibwe Sakina: Grain Merchant

C. Expatriate Personnel (PNS/USAID):

1. David Gas: DAI
2. Ken Kohan: DAI, Former Chief of Party
3. John Gold: PNS/DAI/SCAD
4. Bill Balrymph: PNS/DAI/DGF
5. Ed Slam: PNS/DAI/Pilot
6. David Sonco: USAID/Project Officer

D. Villages Visited:

1. Kaseya
2. Kongolo
3. M'Bulula
4. Kiyonga
5. N'Graba
6. N/Dala
7. Sanga
8. Nyunzu
9. Pendé
10. Makwikui
11. Kibuli