HAITI PRODUCTIVE LAND USE SYSTEMS PROJECT

SOUTH-EAST CONSORTIUM FOR INTERNATIONAL DEVELOPMENT

AND

AUBURN UNIVERSITY

October 1993

This work was performed under USAID Contract No. 521-0217-C-0004-00. The views expressed herein are the views of the contractor and not necessarily those of the U.S. Agency for International Development.

FARMER NEEDS ASSESSMENT EXPLORATORY SURVEYS: CARE NORTHWEST REGIONS 2, 3, & 4

by
Richard A. Swanson
William Gustave
Yves Jean
Roosevelt Saint-Dic

SECID/Auburn PLUS Report No. 10

LAFOND
BARBE PAGNOLE/JACOB
PASSE CATABOIS/SAUVAL

JUNE 23 - JULY 3
JULY 11 - 17, 1993

FORWARD

This report covers the second of five surveys conducted by a multi-disciplinary team led by Anthropologist, Dr. Richard A. Swanson. Additional members of the team included Agronomist Yves Jean, Agricultural Economist, Roosevelt Saint-Dic and Animal Production Specialist, William Gustave, assisted by Agronomist and SECID Team Leader, Dr. Frank E. Brockman and SECID Agricultural Economist, Dr. J.D. (Zach) Lea. The team was assisted and supplemented on-site by CARE staff members.

This survey was part of the on-going effort by SECID/Auburn University and its partners in PLUS, PADF and CARE, to implement a Monitoring and Evaluation System which orients the project towards activities which will bring about sustainable increases in farmer income and crop production, while conserving natural resources. As part of this effort, this survey provides baseline information on farming systems in three watersheds in Northwestern Haiti and identifies constraints to production and opportunities for PLUS to achieve sustainable increases in production and farm income. The survey also provides information on technologies promoted by PLUS, as they are presently implemented in the survey areas. The authors have, in addition, elaborated a unifying theme for project interventions in this region.

This document represents an invaluable contribution to PLUS and our understanding of farming systems in Northwestern Haiti and how they relate to interventions available to PLUS. It has raised issues to be addressed in our implementation program and pointed out opportunities to achieve sustainable increases in farmer income. It has also provided insight as to how various farm enterprises and project interventions can be linked to reinforce adoption of various components and promote a more efficient use of resources and increased on-farm productivity.

Because this report represents only one part of Dr. Swanson's job assignment, an executive summary was not included in this report. The executive summary is published as a separate volume, SECID/Auburn PLUS Report No. 7, which summarizes and integrates the findings of five separate surveys. The present volume contains the detailed findings from surveys in three watersheds in CARE regions 2, 3 and 4 in Northwest Haiti.

Dennis A. Shannon
Campus Coordinator
Auburn University

ACKNOWLEDGEMENTS

We wish to thank the following SECID and CARE staff for their assistance to the time while in the field:

CARE LaFond Staff:
Romual, Joubert Hilaire, CARE Regional Director and Field Coordinator[1]
Athus Pierre, M/E Leader 1
Regis Yves, Region IV leader
Mildred Delphin, Agronomist, and Assistant Zone Leader

Barbe Pagnole:
Delice Jean Claude, Region 2 Leader
Gerry Delphin, Agronomist, Zone Leader (Jacob area)

Passe Catabois:
Occid, Adalbert, Region 3 Leader
David, Harve, Assistant leader and zone leader

We particularly appreciated the interest and importance CARE clearly placed on this survey through the presence of both their regional director, Joubert Romual, and M/E regional leader, Mr. Athus Pierre, who were with us in the field, every day. Dr. Frank Brockman, Agronomist, and Dr. Zach Lea participated with the team during days worked in Passe Catabois.

[1] Accompanied the Farmer Needs Assessment Team to all three CARE watersheds visited and assisted in survey work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF GRAPHS

FARMER NEEDS ASSESSMENT EXPLORATORY SURVEYS
CARE Northwest Regions 2, 3 and 4

0.0 Introduction

"The Productive Land Use Systems (PLUS) project is a USAID/Haiti funded project. The project is implemented by CARE International and the Pan American Development Foundation (PADF). The South-East Consortium for International Development (SECID) provides technical services to PLUS " (Scope of Work, p.1).

The project began as an agroforestry activity directed to small-scale, hill-side farmers (Agroforestry Outreach and Agroforestry II projects). Farmers "were encouraged to plant trees for various purposes. A mid-course correction (by USAID)... mandated that the two NGO's implement a demand-driven approach to the "development of technical packages or 'interventions' offered to farmers" (ibid, p.1). The new project implementation strategy was also to focus "on a variety of land use interventions that stimulate crop production in order to provide sustainable income for Haitian hillside farmers and at the same time address the project's conservation objectives of preserving soil and protecting watersheds" (Project Amendment Document, p. 13). The Farmer Needs Assessment survey was developed as one means of determining "what farmers want from the project".

The PLUS project already has planned acquisition of other significant survey information. Some of this work is already in progress. This SECID survey work was scheduled at a time when PADF was itself in the process of initiating its work in its newly selected M/E 2 km^2 areas. Within these areas, a census and an exploratory survey were being taken by its field agents who had earlier in the year received FSR/E and rapid rural reconnaissance survey training from the FSR program out of Gainesville, Florida. Review of initial reports completed by PADF staff for the Cap Haitien and Les Cayes area was considered by our team to provide a good introduction to the zone upon which we could build. With such information, we would be able to spend more of our time, as we had hoped, in going more deeply into discussions with selected farmers and groups, concerning the opportunities and constraints for development in these areas. Without such information, we would need to ourselves obtain some of it through interviews, before proceeding. We were therefore able to rearrange our schedule of field visits to take advantage of those areas in which PADF had initiated some field reconnaissance. With the CARE program on the other hand, we needed to obtain much of these data ourselves to help provide the context for information sought. In order to distinguish our activities from those less focused exploratory surveys carried out by the PADF field staff therefore, we have chosen to call our activities "farmer needs assessment exploratory surveys".

0.1 Objectives

Most of the following farmer needs assessment survey objectives are met through the discussions in sections 2-4 of this document. This is followed by a number of recommendations the survey team would give to the program, with both short and medium term implications for the project. We have attempted to provide what we considered a unifying theme to help to better integrate (given limited time/resources) a number of priority field activities between PLUS project partners, with implications for on-farm research and monitoring & evaluation activities (PADF/SECID). Specific survey objectives as outlined in the scope of work were:

(1) To better understand farmer **attitudes and beliefs** relating to small scale farm crops, enterprises, and project interventions.
(2) To understand production and marketing **opportunities**. Rank these. Identify how each can be addressed. Identify risks associated with each.
(3) To understand production and marketing **constraints**. Rank these. Identify how each could be addressed. Identify risks associated with each.
(4) To identify those **already existing land use interventions** which farmers are already aware of, and/or practicing which promote sustainable use of resources (land, water, vegetation). Seek to understand nature of adoption, spread, production and land value increases, etc. Give farmer assessments of these interventions.
(5) To focus on potential **new land use interventions** that would stimulate sustainable crop/animal production and income generation.
(6) To identify **farmer goals/expectations/needs** so that project interventions can become farmer demand driven;
(7) To identify a number of on-farm **farmer-managed trials** which could be designed for project interventions (themes, crops, type of area/site, tenure). To identify other opportunities for PLUS project implementation.
(8) To identify **questions/methodology** which will help the project in future reconnaissance and M/E surveys, and in process **train** members of PLUS team in doing this.

0.2 Schedule and Multi-Disciplinary Survey Team:

Surveys were planned for the following regions, with dates as follows:

May 26- June 1	Orientation, Initial Survey Instrument Design, Team Formation, Planning
June 2, 3, 4	PADF Jacmel Region #1, Site 1 (Palmiste Avin)
June 7,8,9	PADF Cap Haitien Region #3, Site 1 (Plaisance)
June 10,11,12	PADF Cap Haitien Region #3, Site 2 (Grande Riviere du Nord)
June 14,15,16	PADF Cap Haitien Region #3, Site 3 (Dondon)
June 17-22	Write up of PADF Cap Haitien Site Visits
June 23	Travel to CARE Northwest Region
June 24,25,26	CARE, Northwest Region 4, La Fond, Site 1
June 27,28,29	CARE, Northwest Region 2, Barbe Pagnole, Site 2
July 1,2,3	CARE, Northwest Region 3, Passe Catabois, Site 3
July 4-10	Break/ Some write-up of Northwest Region
July 11-17	Write-up of CARE Northwest Region Site Visits
July 19, 20, 21	PADF Jacmel Region #1, Site 2
July 22, 23, 24	PADF Jacmel Zone #1, Site 3
July 25-31	Write-up of Region #1
Aug.2,3,4	PADF Mirebelais Region #3, Site 1
Aug.5,6,7	PADF Mirebelais Region #3, Site 2
Aug.9,10,11	PADF Mirebelais Region #3, Site 3
Aug. 12-16	Write-up of Region #3 Site Visits
Aug. 17	To Les Cayes
Aug. 18,19,20	PADF Les Cayes Region #4, Site 1
Aug. 21,23,24	PADF Les Cayes Region #4, Site 2
Aug. 25,26	PADF Les Cayes Region #4, Site 3
Aug. 27	AID Debriefing (Will provide copies of first 4 draft reports and Questionnaire Format Document used in field as survey instrument)
Aug. 28	Swanson Departure
Aug. 30-Sept.10[1]	Final Write-up of Les Cayes Zone #4 Site Visits & Submission of all 5 Reports to SECID Washington for Reproduction and Sending to USAID/SECID Haiti

An interdisciplinary expatriate and Haitian team was formed to implement the exploratory surveys. These were:

Dr. Richard Swanson, SECID Survey Leader and Anthropologist (26/5 - 4/8)
Dr. George Condé, Agricultural Economist (1/6 - 23/6)
William Gustave, Animal Production (1/6 - 4/8)
Yves Jean, Agronomist (1/6 - 4/8)
Roosevelt Saint-Dic, Agricultural Economist (24/6 - 4/8)

Dr. Frank Brockman, SECID PLUS Team Leader and Agronomist and Dr. Zach Lea, SECID PLUS team Agricultural Economist both participated as their time permitted. The team was also assisted by Dr. Dennis Shannon, SECID PLUS team Auburn University project manager, for two days during the initial week in Palmiste Avin.

---

[1] Six work days to be used during this period. Information faxed from Haiti from other team members by no later than September 2 for inclusion in final report for Les Cayes. Reports for other 4 Regions should have been completed in advanced draft stage before Swanson departure and left with SECID/Haiti.

0.3 Methodology

Much of the information being sought through the exploratory surveys is qualitative in nature. This is clear by the objectives which speak of "better understanding farmer attitudes and beliefs", which will require an understanding of the principal production and marketing constraints of the areas identified. The PLUS project wishes to determine "what farmers want" from the project, and how some of these stated "needs" or "demands" can be met through project interventions. Attention will be focused on "focusing on a variety of land use interventions" which could potentially stimulate crop production in a sustainable, ecologically safe manner, while providing increased income potential for the concerned farmers.

0.3.1 PLUS Project Potential Interventions List

The initial list of PLUS interventions include:

(1) Hedge rows (vegetative barriers on contours). This includes leucaena, sugar cane, pineapple)
(2) Dead (plant material) barriers ("rempe paille")
(3) Rock Walls/Terraces
(4) Gully plugs (Rock and/or Vegetative)
(5) Bio-intensive Vegetable Gardens
(6) Improved Seed (Tamazulapa, sugar cane, corn)
(7) Seed Banks
(8) Individual Trees
(9) Local tree nurseries
(10) Deep Tillage
(11) Cover Crops (engrain vert)

Needs Assessment Team Additions:

(12) Gully Ditches (Deep) for Water Harvesting
(13) Contour Ditches
(14) Plantain in contour ditches or canals, or gully plugs (also bamboo, rice)

At each field site, both individuals and groups of farmers were contacted by members of the team. Because of the large number of individuals (5-6) involved in this effort, it was necessary to split the group into two, and sometimes three groups, to permit better contact with farmers and wider contact within each site. We tried to avoid more than 4 people meeting with the farmer (one of whom would be PADF/CARE "extensionist/guide". The PADF/CARE M/E person for the area would also join one of these groups. Farmer contact with the team was voluntary and an effort was made not to significantly disrupt on-going farmer activities. All questions were asked in a free-style conversational manner with farmers regarding the major information needs outlined below. It was important that answers be followed up (Why? When? Specifics?). Field observations were particularly important and considerable

time was spent with farmers on their land, looking at crops, animals, etc. A list of topics and key questions was used to guide the survey team in the interviews, with notes usually taken in a personal notebook for later write-up in journal style on laptop PCs. Consideration of these notes formed the substance of this report.

0.3.2 Questionnaire Formats

Question forms of two kinds were prepared and a special document prepared with the types of questions asked and the tables used in the field for report preparation.

(1) General guideline questions, with leading questions expected to direct conversations in the directions needed. Team members kept their own notes on the responses to the information obtained. Leading questions led to further questions, as greater detail was sought on specific issues. Here, the inter-disciplinary nature of the team was important to provide a more complete technical understanding of the information obtained.

(2) Prepared Questionnaire/Table Formats. Here, specific information on specific cropping patterns, prices/yields, land & livestock management were prepared and were filled out for several farmers and fields in each area. Purpose: to provide more specific objective data to complement the more qualitative information obtained in the other question formats.

0.3.3 Persons/Groups Interviewed

Within each of the three sub-watersheds of each Zone, the team met with at least:

(1) 10-15 individual farmers for discussions and viewing household fields with farmer (husband - and wife, where appropriate). Half would be progressive farmers/innovators, half representing "typical" farmer (chosen by PADF/CARE). Main requirement is their willingness to speak to us, and their ability to express themselves, and having fields on the hillsides of the M/E evaluation sub-watershed.

(2) 2 group meetings (should represent a good cross-section of the farmers in the area) in each micro-watershed should be interviewed. In some cases, a "group meeting" would evolve during one or other of the individual farmer interviews, as passing farmers would join us under a tree or observing some field.

(3) Meet with as many other individual farmers, on their fields, as possible, who have had past experience with soil conservation interventions. Go and visit these sites (even if not within the specific site of the monitoring/evaluation efforts). In some cases, we met such farmers on the way to or from fields of other farmers.

PADF and CARE had both selected 3 micro-watersheds, with area of about 2 km^2, within a total of 5 zones of Haiti (4 for PADF, 1 for CARE) for M/E purposes. The Farmer Needs Assessment team was given 3 days for each micro-watershed. When possible, the first two days were spent on the watershed with farmers, and the third day used for team/project discussion and initial write-up of field notes into a more legible form.

At each field site, the team initially met with pre-selected (by PADF/CARE) individual farmers. These farmers were selected, as much as possible, on the basis of their being considered to be progressive farmers in the site area, farmers who are innovators, farmers who are considered good role models, and project cooperating farmers. When meeting with these farmers, other farmers were sometimes present. This did not pose a problem, but the focus of these early interviews was to obtain insight into a specific farmer household's farming system. If this could be initially held at the farmer's residence, this was considered preferable - to permit the team to observe the "material" well-being of the farmer, in relationship to others in the area, and to also permit some discussion with female members of the household as well. We then would ask this farmer to take us to one or more of his/her fields in the site area for direct observation and further questioning (and filling out information sheets). In some cases, it proved more convenient to conduct individual farmer interviews at the field locations, asking questions and taking measurements there. On the way to such fields, we would often stop and discuss other fields/plots, even calling over the farmer of the field if available. The on-field observations and questioning often took more than 2 hours.

During the first day or two, while working with the first individual farmers, arrangements were made to meet with at least two small groups of farmers in the area during the coming days. Rather than the entire team organizing a meeting with one large group for a "meeting", it is important that it be understood that the meetings would be informal and small (4-5 farmers). One such group meeting would be held by each of the two field teams at each site. These meetings would not last longer than 1 hour, and usually led to contacts for further individual, more intensive interviews on field locations.

If farmers in the area of the field site were found to have had experience with past program interventions (similar to those listed above), or if farmers, on their own have practiced any

interventions of this nature, these individuals were particularly identified early on in the site visit. Plans were made to visit with them at the fields concerned during the survey visit to develop information about past experiences, what has worked and why, what has not worked and why. An attempt was made to quantify positive gains to production and income as a result of these interventions.

0.3.4 Survey Team Information Sharing

Team information sharing took place in several ways. The drive to and from the sites were always well used in sometimes lively discussion. At the end of each day, a short session (up to an hour) was held back at the location where the survey team would be spending the night. During this time, we would discuss the days activities, significant issues about which we had learned, modifications which might be needed in the program or question formats for subsequent visits. This could also take place around the dinner table. Each team member was expected to try to keep a daily journal, written every evening on a laptop provided for this purpose, on significant things learned, and organizing information obtained in that day's field notes. To the extent possible, each team members also began writing sections for the draft report in an on-going fashion, so that when the ten days reserved for each survey region were over, portions of the report would already be in preparation for the initial draft. Because of the long and hot days spent in the field, however (10-12 hours), team members were too exhausted to do much in the late evening. It is for this reason that we early on attempted to reserve the third day (of each watershed) for better write-up of field notes on our laptops (which could be printed out and passed around for comments). This material was then more useful during the final week in preparing the initial draft of the final report. Team members were expected to review each other's draft reports during this time to provide additional insights and comments. By the end of the week following the survey in each field site a rough draft of the report for each zone was completed.

1.0 Description of Micro-Watersheds in CARE Northwest Region

TABLE 1: COMPARATIVE INDICATORS BY WATERSHED

ITEM \ AREA	LaFond CARE Region 4	Barbe Pagnole/Jacob CARE Region 2	Passe Catabois/Sauval CARE Region 3
Department Arrondissement Commune Section Communale	Nord-Ouest Port-au-Paix Bassin Bleu Moustique	Nord-Ouest Mole St. Nicolas Jean Rabel Savane Pouceli	Nord-Ouest Mole St. Nicolas Jean Rabel Cabaret
Resident Households	CARE estimates 100	300 - 500	110
Elevation (meters)	350 - 450	250 -300	130 - 240
Rainfall (X) (mm)	900	855	600 - 800
Soil Characteristics Erosion Depth	Sub-soil: calcareous Clay/loam and fairly fertile. Medium Hillsides (10-15 cm.) Valleys (15 cm+)	Sub-soil: calcareous Sandy clay, basaltic in some places Hillsides (10-15) Valley (30-40)	Sub-soil: Calcareous Sandy clay, Hillsides (20-30 cm) Valley (near 1 m)
Cultivated Slopes	Most < 40% slope	Most < 30% slope	Most< 30%
Land tenure	Most inherited, some renting, very little sharecropping	Land owned by most using them: 99%, some sharecropping: 0.5%	Land owned by most using them (purchased/ inherited), little renting/sharecropping
Land value: Sale (.32ha,1/4cx)	$150-$300 for good land, gentle slope	$75 for land cultivated in corn/ sweet potato; to $200 good land near water with trees	$275 for good land, $125 for poor land
Land rent (.32ha,1/4 cx)	$20-50 good land $100 land by stream $2.50-$4 poor land $4 for 25m^2 garden	$60-$90/year, valley bottom land	$15 for good land
Pressure on Hillside Land	cropping- increasing livestock-intense	Livestock intense	Livestock intense
Daily Labor Rate	3.5 - 6 gourdes	3 - 5 gdes.	3 gdes.
Important Infrastructure in Area	Elementary Schools Passable dirt roads throughout area	Two churches/schools of both Catholic and Baptist. One unpaved dirt road, one market.	Two unpaved dirt roads, one church/school catholic, and other churches/schools at 3 Km, four markets
Key Sources of Income	Corn, livestock	Cassava, livestock, handicraft (palm tree)	Pigeon pea, cowpea, peanut, livestock
Key Consumption	Corn, Pigeon pea, Manioc	corn, pigeon pea, manioc	Corn, pigeon pea, manioc,sorghum, cowpea
Key Animal	Sheep and Mule	Sheep and Mule	Sheep and Mule
Handy craft	Baskets, Animal carrying containers	Baskets, Animal carrying containers	Animal carrying containers (harness)

1.1. LaFond[2]

LaFond, located in CARE Region #4, one of the more disadvantaged regions of the country, is reached over a rough road about an hour (20 km.) from Bassin Bleu, and three hours (50 km.) from Gonaives. The area is generally characterized by many hills and valleys, with small streams flowing within the valley bottoms (cf. Appendix 5 for a photographic overview of sites visited). The area is not heavily wooded even in the lower areas, though many of the slopes are covered with low bushes and brush/grass.

Most of the cultivation takes place on fairly level or gently sloping land, though most farmers also cultivate fields along the slopes of the hills. Though there are mango, avocado, citrus, corosol (soursop), and other fruit tree species in the low areas along gullies and along the streams, one is struck by the fact that there are not more of these. Past CARE efforts in the area are evident from many different species of trees (chene, frenes, leucaena, neem, acacia) which farmers have placed in their fields (though not fruit trees), and with many soil conservation structures.

Farmers and CARE field personnel were quick to tell us that what we were seeing this year was unusual - rains have been unusually abundant and regular this year in a way not experienced for many years. Estimated average rainfall of about 900 mm/year is spaced out over most of the year, with the major dry period being in February-March-April, with greatest rain usually experienced in June. Rainfall is bimodal, with the major season beginning in April/May and running through June/July, and another season beginning around August/September and going through November/December. This is not to say that the fields between these two periods are empty however, as long term crops like pigeon pea, sorghum, and manioc link the two periods. The irregularity of rains is probably the greatest cause of low productivity for this region and the great risk attached to agriculture - leading to the importance placed on livestock in this region (cf. Appendix 4 for a photographic overview of CARE regions visited).

Soils on top of hills, in level areas along the valleys, seem fairly fertile, with high organic content. The clay soils are full of small rocks which offer some protection to the soil from rain drops and in places, are sufficiently large to permit rock terraces. Soils are fairly thin on many of the hillsides, covering a hard, white calcarious layer which has proven impenetrable for some of the fruit trees which have been planted in these areas (and have died off).

---

[2] The survey team is grateful for some information on the area prepared for us before our arrival by the CARE local field team, some of which is included in this general introduction.

Many of the following crops are harvested at various periods of the year, depending on when planting actually took place. Major harvest periods are: corn in July; sorghum in January; pigeon pea in December and April; beans in June, cowpeas in October/ November.

CARE has been the source of most of the agricultural extension efforts in this area for many years and is well known and greatly appreciated. CARE arrived in LaFond in 1988, and initially was involved in administering a central (non-fruit) tree nursery for the area and was very active in various soil conservation efforts (mulching, rock terraces, deep tillage, vegetative barriers). Most appreciated is the food assistance aid and vegetable gardening. In 1990, efforts were initiated with improved farming practices. CARE also collaborated with ODNO in maintenance of the roads into this region as well. Mention was made of some efforts in small commercial ventures, and vegetable gardening made in the past by the Adventist Church in the area and by the Baptists as well.

There is one health clinic serving the entire region. There, one can find certain medications (antibiotics, analgesics, antacid, vitamins, cold medicines, vaccines for children). The clinic is staffed with a person with midwife skills who sets special times to meet various groups of people (children, mothers with infants, pregnant mothers, old people).

Two kilometers from LaFond is a market (Nan Kan) which meets every Monday. Another one (Mombin), in a different direction, and about the same distance, is held on Wednesdays. The big market in the region is held in Bassin-Bleu on Saturdays. In spite of the lack of public transport, all these markets are frequented by people of the micro-watershed area - in a continuing effort to sell the little they have for much needed money. Mules and donkeys are therefore very important means of transport of both produce and people to and from such markets.

There is a public school available to children up to the Certificat level (Ecole Nationale Haut-Moustique), an Adventist Church elementary school in Zabet, and a domestic economy school for young girls.

There is considerable seasonal migration within this region, as families are forced to go elsewhere to seek money to meet needs which cannot be met through the production systems of the region alone. This is particularly true during the dry season months of January - March when some work can be found in Estere within the Artibonite valley, where people are hired in the rice fields or rent land which they can cultivate for a few months. There is also regular movement by many farmers to other areas in March-April-May in Cabaret, and October-November in Haut-Moustique, where micro-climates permit various crops to be grown.

One of the most remarkable aspects of this area is the complex group of strategies which farmers have been forced to develop in order to survive in the area: various household fields are located at great distances from each other, in the valleys, on hillsides higher up, in gorges, in distant regions. This is combined with major reliance on small livestock, and use of pastures.

1.2 Barbe Pagnole/Jacob

The Jacob micro-watershed defined by the CARE technicians as one of the PLUS project M/E sites, has only just begun to receive the special attention planned for it, though it has been within the CARE region of work for many years and CARE is well known in the area. The 8 field agents and 2 fruit tree grafting agents were only named a couple weeks before our arrival.

This site is located over a very rough, rocky, often steep road about 14 miles from Barbe Pagnole, but takes 1 1/2 hour to reach. It can be seen from a high mountain ridge above a deep ravine which defines its eastern side. The Jacob site is actually an entire small 'mountain' (morne) rising from this ravine and is itself part of a much higher mountain system which rises up on its western side. The various smaller ravines which drain this area are covered with only light woods, unlike the dense and lush vegetation we have seen in other parts of the country in such locations. The most visible tree species in the area are the palm trees (latanier) which are dotted across so many of the fields, densely in some locations. Farmers harvest the fronds for roofing material and a very lively basket making cottage industry.

Walking along the paths within this area, a number of things stand out:

(1) Corn is clearly the dominant crop in most of the fields, with other crops located here and there in the field in association with it. The most common associations were pigeon pea and some manioc. We were surprised by the conspicuous lack of sorghum in the fields for this time of year.

(2) The paths and borders of many fields and homesteads are surrounded by a strong sisal-like plant which has been an important soil conservation structure where it has been used.

(3) The area is extremely poor, though not nearly so poor as Passe Catabois. The LaFond area looked like a tropical paradise compared to Passe Catabois, only a few miles away, and much more prosperous and with higher agricultural potential than this Jacob site. Almost all homes are covered with thatch from the numerous palm trees of the area - unlike LaFond which used mostly grass for their roofing material.

Vegetable gardening will be very important for this area but water is going to pose a much greater constraint to its development. Water sources from the major ravine stream or from a

few springs are far down the hillside from where most people are living. In spite of this, a number of people were very enthusiastic about this and had already tried to get started doing such gardens after having seen CARE efforts elsewhere. Such people carry water as much as 1/2 kilometer up the hills to their homes, where the gardens are located. When asked why they didn't locate their gardens nearer the source of water, the answers were that they didn't have land down there, or that, even if they rented land, there would be a problem of theft of the vegetables during the night. The survey team believes vegetable gardening can make a major impact on the families of this watershed for both consumption and sale, but that a careful, integrated approach must be made to this whole issue. Like LaFond, this can be a central theme which can be the focus for a number of other very important activities in the area.

1.3. Passe Catabois/Sauval

Passe Catabois is CARE's 3rd Region, located in Commune of Port-de-Paix, two hours by four-wheel drive vehicle. Sauval is located in the Jean Rabel Commune, and Cabaret Section Communal. This site is the micro-watershed defined by CARE staff as representative of the Catabois area, about 1.14 km^2 in size. Sauval is located west of Catabois, 45 minutes from the CARE regional office. CARE staff has only just begun to work in this zone, and was in process of recruiting field agents during our visit. Data gathered by CARE staff in June 1993 show that Sauval has 14 "habitations" (small localities), with 2 to 6 residence households per habitation.

Sauval is a site with low hills and valleys, most less than 30% slope, at 130-240 meters elevation above sea level. A mountain rises high above the site at the western side. It is relatively green this time of year, with various crops reaching maturity, principally corn and sorghum. Some fruit trees are present: mango, avocado, soursop (corossol), cachiman (sweet sop). Previous agroforestry programs with CARE have introduced such tree species as eucalyptus and neem.

Rainfall is bi-modal, with two rainy seasons: the first and principal one beginning in February and lasting through June (April and May experiencing heaviest rainfall), and in August through November (October-November with most rain). The total rain per year varies between 600 to 800 mm (data recorded in 2 near localities). Soils are relatively deep, with about one meter in the small valleys. Their texture is sandy-clay; color is gray-dark black.

Tenure patterns encountered at Sauval are those encountered in the other sites. Land renting and selling transactions are scarce. One finds two forms of rent: the traditional form where the land

user pays the landholder; and the mortgage form where the landholder obtains money from a user, and gives him a receipt. In this case, there is a risk that the landholder will lose the land to the user if he/she does not remit the money as agreed. There are some rare "large" land holders having 12 to 15 carreaux of land.

Land value for one carreau varies between 2,500 to 5,500 gourdes when sold, and 350 gdes/year when rented. Sharecropping is not a common practice, though where found, the landholder receives between 35 and 50% of the production from the land user.

Within the site there is a small Catholic church with a primary school. Other schools and churches are located at about 3 km from Sauval. Farmers have access to four local markets to which they transport their produce, using donkeys, mules, and horses - the common modes of transport in this region. These markets operate six days a week.

Water is the primary constraint in Sauval and farmers have developed a local means of trying to capture some of the run-off. Many farmers dig out shallow depressions in parts of their fields to capture a little water during the rainy season (for animal and human consumption). These quickly dry up during the dry season, and do not last long even during the rainy season (infiltration into the ground).[3] About 30 households in the site have such small pools. A program of cisterns or water catchment structures would certainly be well received in such an area.

2.0 General Description of the Farming System

2.1 Crops

Statistical data concerning the cropping systems of the Northwest indicate that only four crops are generally significant across the region. Estimates of area (over 50 ha.) under cultivation for the Northwest Department in 1987 were[4]:

Corn	25,700 ha.	
Sweet Potatoes	8,700 ha.	(association)
Bitter Manioc	4,800 ha.	(association)
Sorghum	2,300 ha.	
Black Beans	500 ha.	(association)

Our survey confirms the relative importance of these crops, with some additional detail.

---

[3] One incident will illustrate the value of water here. When driving into the area, our vehicle had to drive through some deep ruts which were full of water. Someone yelled out a complaint, saying that we had "dirtied" their drinking water. As few cars pass this area, the household next to the road was using the water for domestic consumption.

[4] ADS-II Summary Report, 1988, p. 20.

2.1.1 LaFond

Main crops cultivated in Lafond are corn, sorghum, pigeon pea and manioc. Secondary crops are cowpea, bean, sweet potato, lima bean, guinea grass, and plantain. Farmers do not plant sorghum (early crop variety) in the immediate area because, since all farmers don't plant it, the birds would destroy the isolated fields planted when panicles begin to mature. Many farmers rent fields in areas outside the immediate area during the second season (August - December), such as in "Le Bas" (valley region some miles away) where the early sorghum variety is extensively cultivated.

2.1.2 Jacob

Main crops cultivated in this area are corn, pigeon pea, manioc and sweet potato. Though farmers repeatedly told us how important beans were in the association mix of their fields, direct observation of fields showed, in fact, almost no beans present (1 of 54 fields - cf. Appendix 3A). This was explained because farmers have lost their beans in recent earlier seasons and had neither the seed or money to purchase the seed for this past season. We were in Jacob at a time when first season beans should have still been in the fields, if planted, and not yet harvested.

Sorghum (early crop variety) is being introduced into this area. A few farmers have begun to plant it near the household in order to better protect developing panicles from birds. Secondary crops include plantain, tobacco, yam, sugar cane and lima bean (Table 2).

Palm trees such as "latanier" represent a very important cash crop and are found in many fields. It's leaves are bought for making hats, baskets, chairs and roofing material for homes. A packet of 20 palm leaves sells for 3 to 5 gourdes in the nearest markets and reaches more than double this in July when farmers are making house roofs. Many of the trees (neem, eucalyptus) distributed by the Agroforestry II project, through CARE, can seen in this area.

2.1.3 Sauval

Main crops cultivated in Sauval are corn, pigeon pea, manioc, grass and sorghum. Secondaries crops are millet, sweet potato, squash, cowpea and bean. Some farmers also grow peanuts, watermelon and caster bean (Table 2). Many of the trees (eucalyptus and neem) that were given out through the Agroforestry II project were also observed. The survey team kept a list of the fields observed and recorded the crop associations seen in each field.

Table 2 below illustrates the number of times specific crops were seen in these fields.[5] The low count of beans surprised us, given the importance farmers gave them in their discussions.

TABLE 2: MOST OBSERVED CROP IN FIELDS (July 24-July 3)

AREA	JACOB		SAUVAL		LAFOND	
CROP	NB OF FIELDS WHERE CROP ARE OBSERVED	NB OF FIELDS	NB OF FIELDS WHERE CROP ARE OBSERVED	NB OF FIELDS	NB OF FIELDS WHERE CROP ARE OBSERVED	NB OF FIELDS
corn	47	54	42	54	22	46
pigeon pea	25	54	40	54	18	46
manioc	15	54	20	54	14	46
sorghum	5	54	15	54	19	46
grass	2	54	15	54	5	46
sweet potato	13	54	6	54	6	46
cowpea			8	54	8	46
millet			7	54		46
bean (various)	1	54			6	46
lima bean	3	54	3	54	6	46
squash			6	54	2	46
plantain	3	54			4	46
sugar cane	1	54			3	46
tobacco	1	54			1	46
peanut			1	54		46
watermelon			1	54		46
caster bean			1	54	1	46

2.2 CROP VARIETIES AND PREFERENCES

Farmers have preferences for many specific crop varieties, such 'miami', a pigeon pea, 'bout ponyet', a sorghum variety. Farmers generally prefer early and commercial crop varieties. For example, the photosensitive pigeon pea 'Miami' sells better than other pigeon pea varieties because it is fast cooking. Tables 3A, 3B, and 3C summarize common crop varieties

[5] While it is possible that some crops were missed, having been already harvested from field (farmer wasn't always present to ask about earlier off-take), our visit came at a time when most of crops should have been present in the field (or had been newly planted as part of a relay, as in case of sorghum).

cultivated, their origin (if known), and particular reasons why some are grown.

TABLE 3A : CROP VARIETIES AND PREFERENCES (LAFOND)

CROP	VARIETIES	ORIGIN	INTEREST
corn	ticubain (3mois) gros mais (5mois)	local local	precocity dry sensitive
sorghum	bout ponyet populaire	P de Paix local	non photosensitive photosensitive
pigeon pea	tout tan noal ti yaya angeline	local local local local	continuing harvest late sowing early late
manioc	sweet maissade malita fontaine bitter amelie bois papay piecinet	 local local local local local local	 big tuber small tuber early
cowpea	ge nwa blanc	local local	early
bean	red white black	local local local	expensive seeds cheaper seed cheaper seed
sweet potato	justina (9mois) ticharles (5mois) tison santinel tisavin tifoumi diken doreme ti o cap	local local local local local local local local local	late.seed available early seed early unavailable good harvest
lima bean		local	
sugar cane	potoric ananas bamboo	local local local	
plantain	miske grand vingtcent chock banana	local local local local	commercial " " " " " " " " " " " "
squash		local	
caster bean	ti graine gros graine	local local	commercial commercial
tobacco		local	

TABLE 3B: CROP VARIETIES AND PREFERENCES (JACOB)

CROP	VARIETIES	ORIGIN	INTEREST
corn	3 months	local	
pigeon pea	marilis miami la gonave	local	high yield
sorghum	gros sorgho bout ponyet	local local	well sell
sweet potato	listina cuyefe mojene tijanak ti jaune	local local latortue boucan le bas	well sell high yield
bean (various)	red black white	local local local	
lima bean	grimpante baissé bas	local local	earliness
grass	guinee	local	
bitter manioc	denoyer blan cabrit	local local local	
plantain	chuck	local	
sugar cane		local	
tobacco		local	

TABLE 3C: CROP VARIETIES AND PREFERENCES (SAUVAL)

CROP	VARIETIES	ORIGIN	INTEREST
corn	three months	local	earliness
pigeon pea	miami (gray, 9 months) ti yaya (white, 12months) ti revet (yellow)	local local other area	best selling, fast cooking
sorghum	"bout ponyet"(two months growing cycle) "gros pitimi" (photosensitive)	other area local	earliness
sweet manioc bitter manioc	"manita" "ti fontaine" "ti desalie" "stephen"	local other area other area local	
grass	"guinee" "a coce"	local local	sell and animal feed " " " " " " "
millet		other area	early, drought tolerant
sweet potato	"ti celira" (white 6 months) "ti au cap" (red,6 months) "ti nocine" (yellow 6 months)	other area local local	good taste " " " " " "
cowpea	two months	local	
squash			
lima bean			
peanut	two months five months	local local	drought tolerant
watermelon			
caster bean			sell,to make caster oil

2.3 CROP ASSOCIATIONS

TABLE 4: CROPPING ASSOCIATIONS & TIME LAND IS UNDER CROP COVER, WHERE FREQUENTLY FOUND

AREA	VARIETIES	GROWING CYCLE MONTHS	SLOPE [6]
LAFOND	corn, pigeon pea, sorghum	9 - 12	gradual
	corn, manioc, sorghum	12 - 24	gradual
JACOB	corn, pigeon pea, sorghum	9 - 12	gradual
	corn, pigeon pea	9 - 12	medium
	corn, sweet potato,	6 - 9	gradual
	corn, manioc	12 - 24	gradual
SAUVAL	corn, pigeon pea	9 - 12	level
	corn, pigeon pea, sorghum	9 - 12	level
	corn, pigeon pea, guinea grass	9 - 12	level

Common crop associations vary with areas. While the cropping systems in this Northwest region, because of lower rainfall, are not as complex (number of varieties in one field) as in many other regions of Haiti, they are nevertheless diverse. Corn was clearly the key cereal crop in the three micro-watersheds during the first season, most often associated with at least pigeon pea or manioc. Some maturing sorghum was observed in lower areas, particularly in the valleys several miles from the survey sites. Sorghum would be the dominant crop in fields during the second season. Appendix 1 provides a listing of all the associations observed, with the number of fields of each seen.

JACOB

In this area common crop associations are:
- corn, pigeon pea and sorghum
- corn pigeon pea
- corn, manioc

many fields contain only one crop:
- corn
- sweet potato
- manioc

SAUVAL

Common crop association in Sauval are:
- corn, pigeon pea
- corn,pigeon pea ,sorghum
- corn pigeon pea grass.

[6] We define slope into four class:(1) Level:0%-5%;(2) Gradual:5%-20%;(3) Medium:20%-40%; and (4) Steep:40%-75%+.

LAFOND

Two crop associations most frequently observed:
- corn, pigeon pea, sorghum
- corn, manioc, sorghum

Many fields have one crop:
- cowpea
- guinea grass (Panicum maximum)
- plantain
- sugar cane

Corn is the main cultivated crop. The common crop association within the three areas is "corn, pigeon pea, and sorghum".

Most fields do not include more than three crops. Crop association growing cycles are very short, except in the gorges, where cultivated associations include bitter manioc and plantain.

TABLE 5: NUMBER OF CULTIVATED CROPS ASSOCIATED AND NUMBER OF FIELDS

CROP/POPULATION (# of Crops in Association)	LAFOND (# of Fields)	JACOB (# of Fields)	SAUVAL (# of Fields)
1	5	11	2
2	11	18	13
3	11	16	22
4	7	4	9
5	3	0	5
fallow	5	5	2
6	3	0	1
9	1	0	0
TOTAL	46	54	54

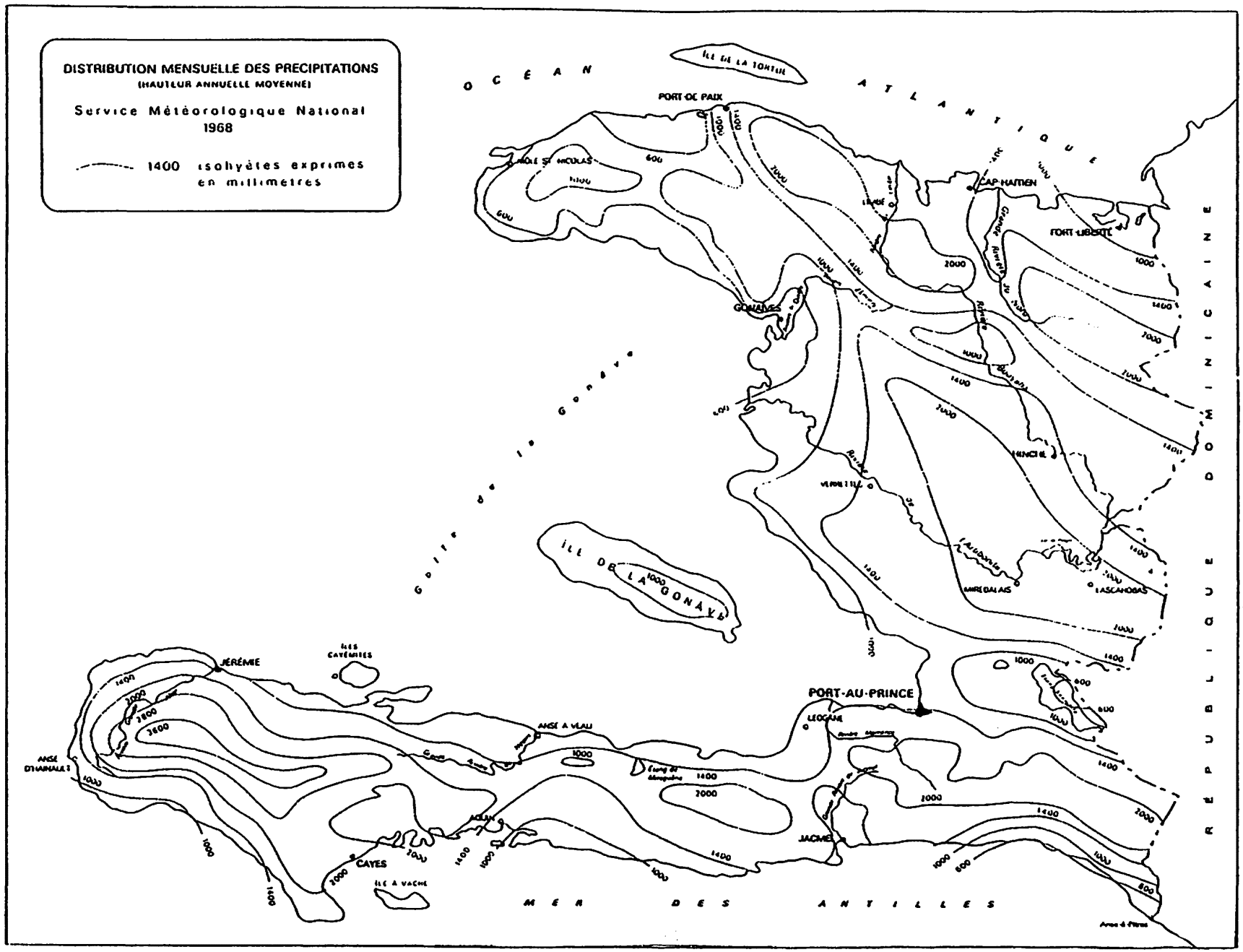
2.4 CROP MANAGEMENT

2.4.1 Land preparation

Land preparation is done by a simple weeding, often using the end of a machete. Soil is generally not turned over. Sometimes farmers make hills for sweet potato or manioc during planting. Land preparation always starts at the beginning of each rainfall season.

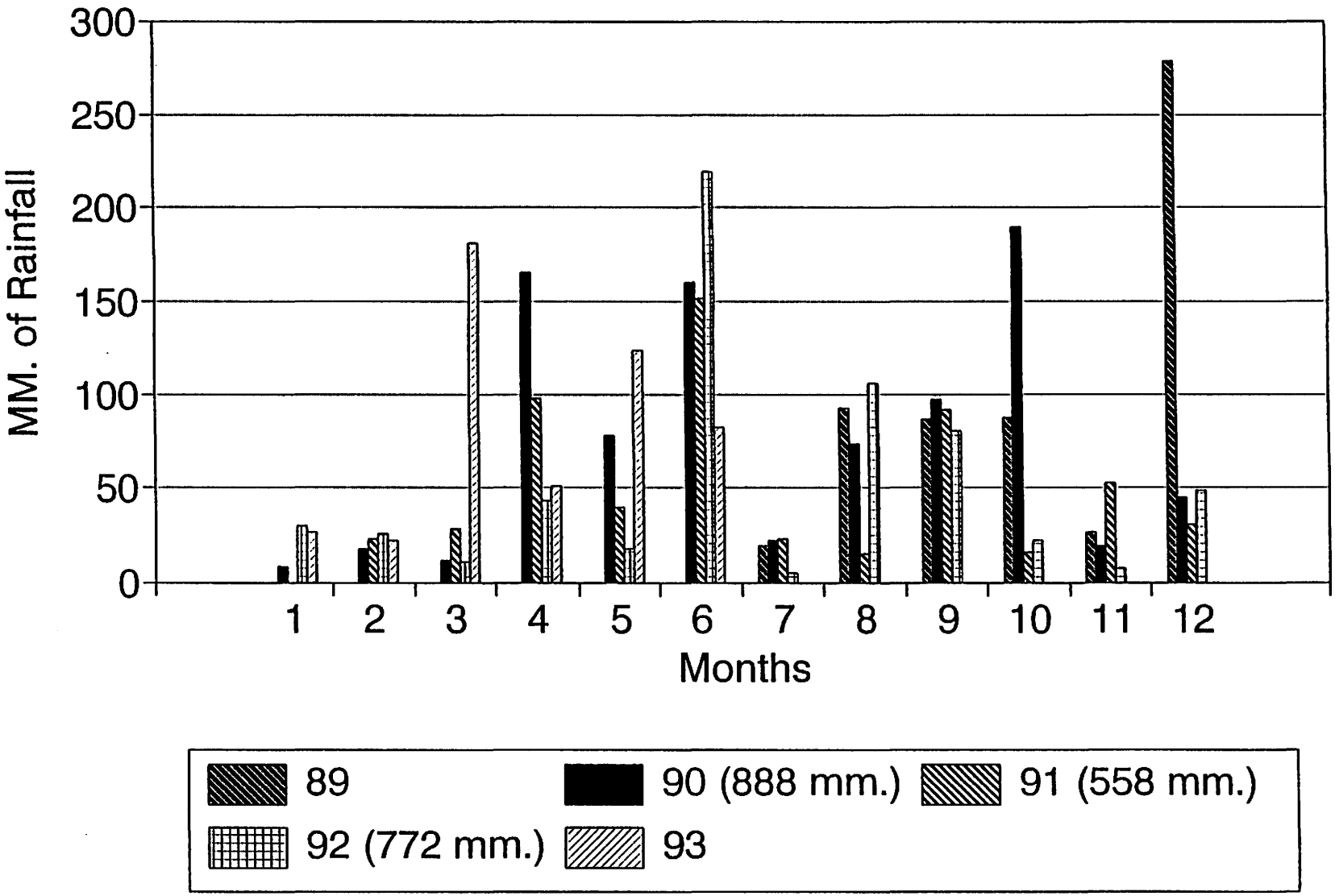
2.4.2 Cropping calendar

Two principal planting seasons have been identified:
- February through May
- August through December.


DISTRIBUTION MENSUELLE DES PRECIPITATIONS
(HAUTEUR ANNUELLE MOYENNE)
Service Météorologique National
1968
1400 isohyètes exprimés en millimètres
OCÉAN ATLANTIQUE
ILE DE LA TORTUE
PORT-DE PAIX
MOLE ST NICOLAS
CAP HAITIEN
FORT LIBERTE
GONAIVES
GOLFE DE LA GONAVE
ILE DE LA GONAVE
PETITE RIVIERE
MIREBALAIS
LASCAHOBAS
HINCHE
JEREMIE
ILES CAYEMITES
ANSE D'HAINAULT
ANSE A VEAU
PORT-AU-PRINCE
LEOGANE
JACMEL
AQUIN
CAYES
ILE A VACHE
MER DES ANTILLES
REPUBLIQUE DOMINICAINE

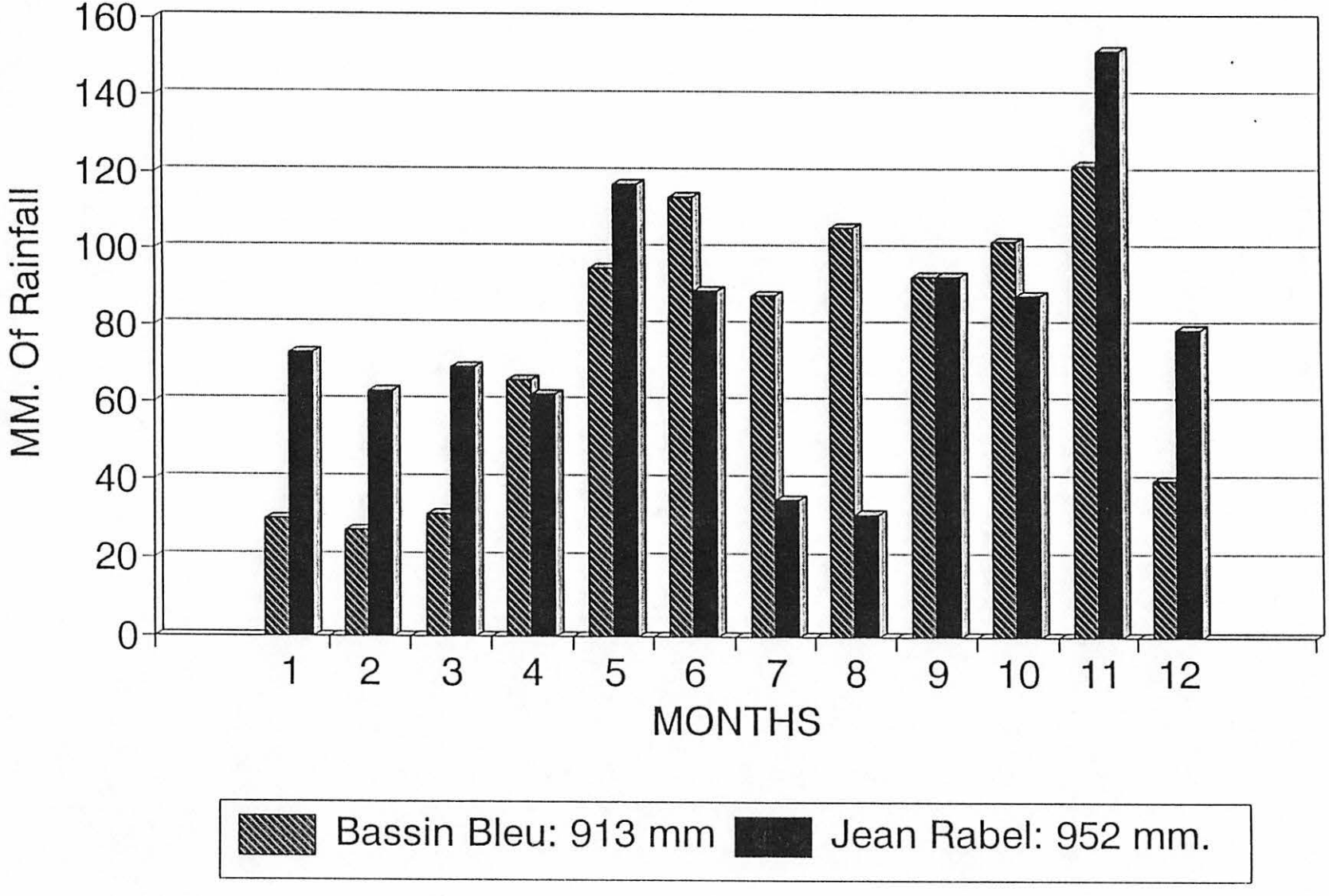
Barbe Pagnole

Northwest Region



Bassin Blue (1925-1944)

Jean Rabel



Harvest periods are related to crop variety and date of planting. Corn can have two planting periods. It is harvested three to five months after sowing. Bean can have three planting seasons. The third season is always located outside the survey site in another area called "Le Bas" (a valley region). Pigeon pea can be planted at the beginning of either planting seasons. The crop varieties are photosensitive and are harvested until February or March. Figures 1, 2, and 3 provide information on rainfall patterns in this region and should be considered when reading the tables below. Farmers told us that the months of January, February, and July are generally the lowest rainfall months, which is also evident from Figure 3 (Barbe Pagnole)[7].

TABLE 6A: CROPPING CALENDAR (LAFOND CARE Region IV)

YEAR	1992	1993	1994
CULT/MONTH	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
corn	S---- --- H___		
bean	S---- H___		
pigeon pea	S---- -	--- H___	
cowpea	S---- --- H___		
sweet potato	S---	H___	
lima bean	S---- H___		
manioc	S---- --	H___	
sugarcane	S---- --	H___	
plantain	S-----	H___	
grass	S---------- H___		
squash	S----- H___		
caster bean	S---------- H___	___	___

Note: S=seeding or planting, H=harvest.

[7] We have provided rainfall data for Bassin Blue (for LaFond) and Jean Rabel (for both Barbe Pagnole and Passe Catabois). Generally speaking, the lower the likely annual rainfall (as in this region), the greater the variability between years on when rains will begin - and continue. Therefore farmers are forced to often plant with the first likely planting rain - a big risk to his seed stock.

Plantain and sugar cane can be planted at a number of times during the year. They can be harvested, each year, over a period of three years. Actual planting/harvesting cycles vary with specific farmer needs. Though sweet potato can also be planted at a number of periods during the year, it is most often initiated during the second season. Planting of some vine cuttings often begins in June or July (dry period) in order to produce enough cuttings for later in the year.

Farmers plant both photosensitive and non-photosensitive varieties of sorghum. Both can be sown in the first growing period and are left in the field until the end of the year. These are often trimmed back (for animal forage) or tied to prevent shading of crops planted during the first season. A second date of sowing is for non-photosensitive sorghum during the second growing season, in other areas such as "Le Bas", a valley region several miles away (cf. Table 4 cropping calendar).

TABLE 6B: CROPPING CALENDAR (JACOB CARE Region II)

YEAR	1992	1993	1994
Cult/Month	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
corn	S------ --- ----- H_____ ___ _	___	
pigeon pea	S------ H__	_____	
manioc	S------	H_____	
potato	S------ ------- H___	___ ___ ___	
sorghum	S------ H_____	_____	
lima bean	S---- --- H_ ___ ___		
bean	S---- -- H_____		
plantain	S------ --- --- H_____	_____	_____
tobacco	S--- H___		
sugarcane	S------- --- --	H_____	_____

TABLE 6C: CROPPING CALENDAR (SAUVAL CARE Region III)

CULT/MONTH	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
corn	S------ ----- H_____	____	
cow pea	S---- --- H____ ___		
pigeon pea	S--- H_	_____	_____
manioc	S----------	H_____	_____
sweet potato	S------	H_____	
bean	S---- --- H____ ___		
peanut	H---- ----- H_____ _	____	
sorghum	S- ---- H__ _		

2.5 Crop Rotation and Fallow

Crop rotations vary with location of fields. Farmers never fallow fields located near the household. In such fields, crop rotations are the same every year. However, when crop associations include crops such as manioc, sugar cane, or plantain, their growing cycle becomes very long and can last over two or three years. To the extent that it is possible to cover hillside fields with vegetative cover for the longest continued period of time, it will be possible to improve soil protection on these slopes. The key crops which contribute to long term coverage of this kind include pigeon pea, the cultivated grasses for forage, and, to a lesser extent, manioc (cf. Graphs 1,2, and 3).

Farmers sometimes fallow fields that are located on the hillsides for two years or more. These fields are very important grazing areas for household animals during this time.

GRAPH 1 CROP ROTATION (LAFOND)

```
  Sowing       Harvest
(April 92) -> July-August -> (Jan-Feb 93) -> (March 93)

corn            corn
sorghum                        sorghum
pigeon pea                                    pigeon pea
```

GRAPH 2 CROP ROTATION (JACOB)

a) In fields near household

```
SOWING       HARVEST                                        SOWING
(March)  ->  (July)   -> (Nov.Dec)
                         (Jan.Feb 94)  ->(March 94) -> (March 94)
corn          corn                                        corn
sorghum       sorghum                                     sorghum
pigeon pea                pigeon pea                      pigeon pea
sweet potato              sweet potato                    sweet potato
manioc                                        manioc      manioc
```

b) In fields on hillside land

```
SOWING          HARVEST                              SOWING
( Sept)   ->  (Dec,Jan 94) ---->(Jan 94) -->       (Sept)
corn          corn                Fallow
bean          bean
```

GRAPH 3 CROP ROTATION (SAUVAL)

a) In fields on hillside land

```
 SOWING        HARVEST                              SOWING
(March 92) --->  (July) -->(nov,dec)  --------> (March 93)
                          (Jan,Feb 93)
corn          corn                               corn
 sorghum       sorghum                            sorghum
 pigeon pea               pigeon pea              pigeon pea
 sweet potato             sweet potato            sweet potato
 sweet manioc             sweet manioc            sweet manioc
```

b) In fields near household

```
SOWING          HARVEST                              SOWING
(March 92)---->(July)  ---->(Nov,Dec) ------->(March 93)
                             (Jan,Feb 93)
corn            corn                                 corn
sorghum         sorghum                              sorghum
pigeon pea                    pigeon pea[8]          pigeon pea
```

[8] Because of low rainfall and crop loss, pigeon pea planted last year has been left in fields.

Because of low rainfall and pest constraints, crop yield is often very low. Last year many farmers lost everything in their fields (cf. Table 7).

TABLE 7: YIELD OF PRINCIPAL CROP (Marmites Harvested per 1 Marmite Planted)

CROP/YIELD	LAFOND	JACOB	SAUVAL
corn	80 to 120	40 to 80	30 to 50
sorghum			50 to 60
pigeon pea	15 to 20	15 to 20	25 to 30
peanut			122 to 13
bean	6 to 10		
cow pea			30 to 40

2.6 Seed for Planting

Farmers depend on one of five sources for supplies in seed at time of planting: their own stock, stock of local trader (Madame Sara), market, gift or buying from other local farmers, and donation of a P.V.O. The last form is particularly true for Lafond.

Seeds coming from the market place or given as a gift (donation) can be of very poor quality because of low rates of germination, two to three varieties mixed together, or because varieties are not adapted to the zone.

Because of the successive droughts of the last few years, the first source (own stock) has become more and more scarce, sometimes being entirely lost. The problem is so serious that many farmers, during the past year either did not have enough seed to plant the entire area they wished to plant, or could not plant at all. This was particularly true of beans - a very important food and cash crop for these people in normal times. Furthermore, at Jacob, and at Sauval, these successive droughts have resulted in the disappearance of some varieties, especially pigeon peas at Lafond, and manioc at Lafond and Sauval.

This helps to explain also the high cost of seed, particularly for the grains. Farmers are obligated to sell their livestock in order to purchase the seed needed to produce the crops they need for household consumption.

2.7 Crop Marketing

2.7.1 Prices

Between the planting and harvest period (known as the 'time of lack' [soudure]), crop prices record extreme rates of fluctuations. Table 8 below presents data for the three zones on this variation.

TABLE 8: RANGE OF CROP PRICES (Gourdes)

	LAFOND		JACOB		SAUVAL	
	Low	High	Low	High	Low	High
Corn	3.6	10	4	15	5	15
Sorghum	4	15	5	12	5	11
Beans	16	33	15	25	-	-
Cassava flour	-	-	-	-	2	7
Manioc	-	-	30/panye	45/panye	31/chaj	55/chaj
Millet	-	-	-	-	6	12
Pigeon peas	8.2	20	8	10	8	25
Plantain stalk	17.5	27.5	-	-	-	-
Sweet potato/sack	13	70	8	25	-	-
Peanut	5	14	-	-	10	15
Cowpeas	11	32	10	20	11	23
Coffee 2 pounds	12.5	25	-	-	-	-
Tomato/ unit	0.75	1	-	-	-	-
Cabbage/ unit	1.3	2	-	-	-	-
Mango	4.5/ panye	8.5/ panye	0.03/ unit	0.1/unit	0.09/ unit	0.14/ unit
Citrus	3.5	15	-	-	-	-
Soursop/unit	-	-	-	-	0.20	
Latanier:Green leaves/unit	-	-	0.23	0.33	-	-
Latanier:White leaves/unit	-	-	0.5	1.0	-	-
Green basket/ unit	-	-	0.4	0.5	-	-
White basket/ unit	-	-	0.7	1.0	-	-

Note: Units in Marmites unless otherwise stated.

It must stressed that, in most cases, the "high prices" for the grains, and the basket prices are not "farm gate prices", but rather prices in the market at which farmers often have to 'buy back' these products, if needed, from the Madame Sarah merchants.[9] Well off farmers, with greater production potential and more financial means permitting price speculation, would be able to benefit from the high prices available at certain times of the year for most crops. Low crop prices generally correspond to prices received by the farmer during the first month or two following harvests, when farmers are often FORCED to sell because of their desperate need for cash.

Variations in price can reach as much as 400% of the initial farm gate price at harvest. Table 9 below illustrates this variation for the three different zones.

Table 9: Price Variation Rates: Classification of Crops

% Increases over Farm Gate Prices at Harvest	LAFOND	JACOB	SAUVAL
> 200%	corn, cowpeas, sorghum, cabbage	corn, sweet potato	corn, manioc flour, mango
100% to 200%	cassava, beans, pigeon peas, peanut, coffee, citrus, mango	cassava, beans (red), white leaf of latanier	manioc, cowpeas
50% to 100%	plantain, tomato	sorghum, pigeon peas, beans (black, and white)	sorghum, millet
20% to 50%	-	products of latanier (green leaf and basket)	-

High prices variations for corn and cassava are a generalized phenomenon, with the three zones facing the same problems. At Jacob and at Sauval, price variations for sorghum are relatively moderated, because in these zones there are two harvests a year (a non-photoperiodic variety in March/April, and photoperiodic variety in June). Many farmers in these watersheds also have sorghum fields in the more distant valley plains (Le Bas) during the latter part of the year.

2.7.2 Markets and Consumption

It was very difficult to quantify consumption versus production. Indicative information for some crops:

---

[9] We do not want to give the impression here that the Madame Sara are the "bad guys", gouging farmers by speculating on grain prices. They, in fact, are performing an important service, storing grain under conditions that the farmer is not able to, and therefore providing an important service to the farmer. Madame Sara also face important risks and costs, which they must cover with such prices.

LAFOND

. corn: 70% is consumed;
. spinach of a BIG: 50% of consumption.
. total production of a BIG: 25% is consumed.

JACOB

. corn: consumption, 25%;
. sweet potato: consumption, 25%;

SAUVAL

The percentage of consumption of corn is 50%.

A market/producer survey conducted in these zones in April 1993 provide some further information, shown in Table 10 below.

Table 10: Percentage of Consumption of Selected Crops [10]

Zone	Sorghum	Beans/ White	Pigeon Peas	Cassava	Sweet Potatoes
Granma/Near Sauval	71	-	45	37	50
Catabois/Near Sauval	62	39	-	20	33
Baze/ Near Jacob	73	61	-	50	-
Nankan/Lafond	88	60	98	-	0
Mombin/ Near Lafond	54	37	42	40	70

2.7.3 Real Beneficiaries of the Marketing System

LAFOND

The marketing system in two watersheds (Lafond and Jacob) is controlled by a relatively high number of Madame Sara traders. At Lafond, we were able to identify a dozen that buy and stock food grain (corn, sorghum, cowpeas, pigeon peas). At Jacob the number is higher. The profit these traders realize is high. Within two to five months, they are able to realize a gross return of between 25% - 200% Corn, cowpeas, and beans give the highest margins of return. An interesting example will illustrate this point: in three years, one Madame Sara (Lafond) interviewed had multiplied her working capital by 10 (900% increase). Even considering the working costs and storage losses, the returns to capital investment are extremely high.

---

[10] R. Saint-Dic, "Marketing Research Measurement of Coefficients and Producer Information", SECID/Auburn, May 1993.

The real beneficiaries of the agricultural process are these traders and not the farmer. When a farmer plants one carreau (1 cx. = 1.29 ha), he may realize about 320 gdes (with a yield of 80 marmites, and an average price of 4 gdes a marmite). The Madame Sara on the other hand gains 800 gdes (80 marmites at 10 gdes). The farmer, who should save some of his seed for the next season, often sells all (except for consumption needs), and returns to market to buy back his seed needs at much higher prices from the Madame Sara. In order to demonstrate this process, Table 11 below shows what takes place (see also Table 8).

Table 11: Prices Merchants Buy and Sell at, and Timing

Crop	LAFOND		JACOB	
	Purchase Price and Month	Sales Price and Month	Purchase Price and Month	Sales Price and Month
Beans	15 gdes/m[11], June	25 gdes/m, Nov.	17 gdes/m, Jun/July	35 gdes/m, Oct./May
Pigeon peas	8 gdes/m, February	10 gdes/m, April/May	-	-
Cowpeas	10 gdes/m, Nov.	20 gdes/m, April	-	-
Corn	5 gdes/m, Aug/Sept.	15 gdes/m, October	4 gdes/m, June/July	15 gdes/m, Oct/May
Sorghum	6.5 gdes/m, Jan.	15 gdes/m, May/Jul	-	

2.7.4 Marketing and Storage Constraints

The majority of farmers have problems related to market conditions: poor roads, price variations, destruction of products in storage, lack of transportation. Jacob and Sauval seem be the zones where the problem of transportation is particularly critical. This problem affects the farmers all the year, but most particularly during two peak periods: March/April, and October/November.

All farmers have grain storage problems for corn, sorghum, pigeon peas, and beans. Women that sell products in "latanier" have a similar problem. When the product is kept more than three (3) months in storage, there is discoloration, which reduces the commercial value of the product. There is also serious attack of bruchids on beans and cowpeas in the fields. We observed one farmer winnowing/sorting cowpeas in his court yard. At first we thought, because of the very extensive damage to the grain (seeds filled with holes, half eaten away), that this must be last year's cowpeas being prepared for planting or eating (not having received

[11] "m" here refers to price per marmite. Months mentioned refer to period of purchase or sale.

any insecticide treatment). We learned that the cowpeas had just been harvested from the field![12]

To define problems that affect grain in storage, farmers use three terms: "mit", "pike" (the grains have cavities), "rat" (rodents). What the farmers call "mit" attack (we suspect mites) is generally a problem affecting corn, sorghum, cowpeas and beans. Rodents also cause great damage to the beans in the field.

To control these pests, farmers could use insecticides such as sevin, sumuthion, and DDT. Coffee powder, neem powder (made with the leaves), ashes, piment powder, use cats to control rodents in the house, early sale of the products, are various means used by farmers to try to minimize storage constraints. The project might also consider introducing the use of neem kernel extract as an insecticide. The "Madame Sara" that practice grain storage for their successful businesses systematically use insecticides. Their loss is relatively low: 5 to 6% for the corn, and 2 to 3% for the peas.

2.8 Livestock in the Northwest Region of Haiti

2.8.1 Types of animals owned, nature, reasons for ownership

At Lafond, Jacob and Sauval, the majority of farmers keep numerous sheep, goat, donkey, mule, horse, chicken, some cow, but few pigs. Sheep and goat are raised to be sold when the farmers need money for planting, children scholarship, illness. Children help a lot in the care of animals, leading them to pasture or water and bringing them home in the evenings. Donkeys, mules and horses are very important for transportation, taking produce to and from markets, carrying water for domestic consumption from distant streams or springs. Motor vehicles (usually trucks) are rare, going only to distant large towns and cities. Cattle are only sold when important investments are to be made, (eg. land purchase), or in major emergencies (serious health problems, death).

The share ownership system (Gardiennage) is an important method for animal care in all three areas. This system permits a (better off) farmer to keep animals off his own land[13], placing it (a female) under the care of another person who will 'guard' it for the owner, caring for it and feeding it as required. The animal guardian will have the opportunity to gain an animal (from young born) for himself through this arrangement, without an up-front

---

[12] Bruchids can be controlled in stored grain by coating with a small film of vegetable oil of any sort. The high infestation rate of grain in the field suggests that the harvest may not be timely. Bruchids can be eliminated as a problem in cowpeas through breeding. (Shannon observations).

[13] He would do this either because he has too many animals already kept on his own land, or he doesn't have land of his own with adequate pasture for the animals he wishes to keep.

cash investment.

Few of these animal guardians are specialized in animal husbandry. They can be managing more than 10 animals at some times. They will usually reserve a flat field with couch grass for pasture. Their benefits then depend on the production of young from the animal kept. They will keep every other young produced, with the owner getting the other half.

Rustic pigs have only just been introduced at Jacob by Inter-Aid project. Unfortunately, the program is not exploiting the traditional animal guardian system for distribution. The pigs being distributed are being kept by farmer groups under conditions defined by the project. Few farmers have their own pigs. At Lafond, the S.O.E. project had introduced rustic pig with organized groups as well, but few pigs from this program are still alive today. Farmers often explained to us that their poor situation doesn't allow them to keep pigs (not possible to purchase supplemental feed). No farmers have pigs at Sauval.

2.8.2 Feed and seasonal availability in the Northwest Region

Pasturing on fallow lands is the common method of feeding herbivores in the Northwest. Feed availability is generally sufficient during the rainy season months between April and December. During this time, farmers use cultivated grass (guinea, koss), natural pasture, residues from crops (bean, corn, sorghum). The best natural pasture comes from couch grass, but over grazing has given rise to less suitable grasses (eg. lalo). Table 12 illustrates the availability of important animal feed in the Northwest sites visited.

Table 12: Feed and Seasonal Availability for Herbivorous Livestock in the Northwest

	j f m a m j j a s o n d
couch grass	**********
guinea grass[14]	------**********
koss grass	------**********
lalo	**********
leucaena	*****
crop residues	* **********
tree leaves	***

Farmers cultivate grasses in their major fields (associated with other crops), as well as in plots specifically set aside for this purpose, for use by their animals in the dry season. During the dry season, these dried guinea or koss grass stocks, though

[14] Priority for big animals in dry season.

important, are low in nutrients. Goat and sheep also receive tree leaves and leucaena in the dry season where they are available. The end of dry season is the most difficult period for the animals, as fallows are diminished as farmers begin to prepare fields for the new cropping season. Both feed and drinking water is scarce.

Pigs have greater feed problems. Because there are so few fruit trees in the region, this potential source of pig feed is limited to some excess mango and guava. We met one farmer at Lafond who buys rice and wheat bran to feed his pigs and to supplement feed coming from his personal fields. However, the need to buy feed on the local market for pigs is clearly a major limitation for the majority of farmers in the region, which is one reason that they prefer to raise other animals. Greater availability of leucaena hedgerows could become an important source of feed for such farmers. Table 13 illustrates feed availability for pigs during the year and the potential costs involved.

Table 13: Feed availability for pigs

	j f m a m j j a s o n d
Avocado	*****
Corn	**********
Mango	*****
Palm seed[15]	**********
Rice bran[15]	**********
Wheat bran[12]	**********

2.8.3 Health and care

There are no serious disease problems among livestock in this region! Minor diseases like diarrhea occur at the beginning of the wet season. The major cause of animal mortality can be attributed to weakness of constitution after the dry season due to poor feeding. For chickens, epidemics like Newcastle disease regularly pass through, causing major loss. At Sauval, many farmers dig out depressions near their homes where they collect rain water during the rainy season. The water is used for household needs and animals. We observed extensive infestation by mosquito larvae. Though farmers did not mention a mosquito problem, malaria fever almost certainly could be a problem. In the dry season, the pool is empty and, as with farmers in the other two watersheds visited, farmers have to go far in search of water. In the dry season animals eat dried grasses and need a lot of drinking water.

Farmers don't use any product against internal parasitism. Some farmers put insecticide over their cattle when they think there are too many ticks. Regular movement (staking out in

[15].- bought by one farmer at Lafond

different areas every day, and separate staking at night) and the natural resistance of these animals (hardiness) are major factors in livestock health in the area.

2.8.4 Reproduction

In the three areas, reproduction parameters resemble each other, illustrated in Table 14.

Table 14: Reproduction Parameters for Livestock at Lafond, Jacob and Sauval

	Lafond	Jacob	Sauval
period between 2 litters			
cattle	14 mth or up	-	10 mth or up
goat	7 to 12 mth	7 to 12 mth	12 mth
sheep	6 and up	7 and up	7 and up
pig	-	-	-
separation age			
cattle	7 to 10 mth	4 mth to up	4,5 mth or up
goat	4 to 6 mth	4 to 6 mth	4 to 6 mth
sheep	2 to 3 mth	2 to 3 mth	2 to 3 mth
pig	2 to 3 mth	2 to 3 mth	-
litter size			
cattle	1	1	1
goat	1 to 3	1 to 3	1 to 3, 4
sheep	1 to 2	1 to 2	1 to 2
pig	5 to 10	2, 4 or more	-

At Jacob and Sauval, farmers try to maximize reproduction of their animals, (at the expense of selling milk). Calves are separated from the mother at a very young age and farmers breed their cows very quickly, sometimes at the first heat after birth of the calf.

Goats usually produce one set of kids per year while farmers say that sheep can have easily 2 sets per year. Both give 2 young at each birth period. Sometimes as many as 3 or 4 kids are born at one time!

Sows have many reproduction problems at Lafond and Jacob. Feed availability is the major reason for this problem. We met one farmer in LaFond with a sow that reproduced normally, but he regularly purchased wheat and rice bran to mix with his production of corn and fruit. Few have the means of doing this at this time.

2.8.5 Production

Milk production is low in the three areas. Farmers start to milk cows at 22-30 days after birth, sometimes later, and stop with the separation from the mother. Production varies from 2 to 4 liters at each milking, but farmers don't take it every day. Four days are reserved for the calf, and three for milking each week.

Milk production from the goat is about 0.5 liters per day and is used only by children. The growth of sheep is faster than the growth of goat in the 3 areas. Unlike with goats, farmers can sell young as early as five months. For this reason, and because of their natural hardiness, sheep appear a particularly attractive livestock option for farmers in the region and their development should be greatly encouraged.

2.8.6 Markets and Consumption

Milk and eggs are usually used for household consumption, and not sold. Animals are sold on the market and meat consumption within the household is very rare. Major periods for animal sales occur in March/April for the planting period (need for seed, other supplies) and September/October for children school supply needs. Table 15 gives the range in animal prices by category and age.

Table 15: Animal Prices by Category and Age in the Three Watersheds (Gourdes)

	Lafond		Jacob		Sauval	
	low price	high price	low price	high price	low price	high price
sheep						
reproductive	200	400			400	500
castrate 18 mth	400				400	500
young 5 mth	-				150	
goat						
reproductive	200	400	200			350
castrate 18 mth			250			350
young			150		75	100
pig						
adult	1000	1500				
piglet	150	200				
cattle						
cow	1500	3000				
bull						3000
young female					1500	

Conditions for use of a breeding male varies by type of animal. There is no cost for breeding a goat or a sheep. For cattle, pigs, horses, there is a fee to pay and the conditions vary with the owner. One problem farmers do face is the lack of breeding males. Males are fattened up and sold off as quickly as possible for cash. The result is that it can often be difficult to find a male for breeding. Many farmers have difficulty recognizing the time when a goat comes into heat, and if a male is not available within the household herd, opportunities are sometimes lost. The animals will be taken to a neighbor's field and staked near a male. One pig farmer we interviewed had been using a young healthy boar for the past six months breeding females of his neighbors and receiving promise of the choice one young from each group of young born. He recently castrated it. When asked why he had done this (when he could continue to realize benefits of breeding), he said that he needed the money and that he "wanted to make room" for the young (from the breeding) he would be receiving, he couldn't feed them all. But now the area doesn't have a breeding boar close by. Table 16 gives the conditions to use a breeding male in the three areas.

Table 16: Stud Breeding Fees/Conditions in the Northwest Region

cattle	pig	horse	goat	sheep
5 to 10 gdes	25 gdes or a piglet after birth	10 gdes advance and 40 gdes after birth	free	free

The choice of the male depend on the proximity of the animal and the relationship between the farmers. A pig owner can make money with his male as most farmers seeking this service for their animals would rather (1) not come up with the cash payment; (2) take the risk that the breeding did not succeed; (3) provide one of the young in payment 4 months after the service.

2.8.7 Animal/Soil conservation and BIG Gardens Interaction

In the dry season, farmers with hedgerows often tie their animals near the hillside hedgerows and permit their animals to feed directly. In trying to understand why farmers would do this, a clearly destructive process for both field and hedge rows, it became apparent that such farmers often did not have complete control of these fields. The fields were in the 'undivided inheritance' category, and when the farmer was not directly using the field for food grain production, and left it to 'fallow', then anyone in the family had rights to pasture their animals here (as they have always done in the past - the pasture <u>is</u> needed). Knowing that his family will pasture their animals there anyhow, a farmer will take the short term benefits and put his own animals there too (even though he may understand the long term impact). Furthermore, while farmers do appreciate the forage value of the leucaena, they do not like the aggressive qualities of leucaena, which, when <u>left in the fallow and unchecked state during the rainy season</u>, will spread out extensive roots and will spread aggressively through seeding between rows. Removing these young plants in a fallowed field during field preparation requires considerable work. While the solution is to trim the leucaena regularly as feed for animals (**even during the rainy season**), farmers have not been doing this - preferring to let their animals **directly trim** the fields during the dry season as a fresh forage (when again it should be cut and carried to animals). Clearly, better management of the leucaena strips is required year round. These over-grazed fallow fields also result in the loss of the couch grass to the profit of the less useful lalo grass. Farmers do point out the benefits of the manures left on the fallow fields, but much of its value is lost with over-grazing and sun/rain exposure.

For the construction of the bio-intensive garden plots, farmers have been going around with a basket and randomly collecting manure

where it can be found (around the stakes of household, in fallow fields, etc.). This is included with the leaves/grass, etc. during the preparation of the soil and in creating the raised up 'bands'. Most of the CARE participating farmers beginning to work with these BIGs had 3 or 4 such upraised garden plots. The organic material is left for several weeks to rot down before transplanting takes place into the strips. Manures are not added to the gardens after this initial input, even though the gardens may be in production for several relays of crops over the next 4-6 months. Efforts need to be made to more efficiently collect household animal manures and to more regularly use these in the BIGs and elsewhere.

2.9 The Land

2.9.1 Land Tenure

Land tenure statistics for the Northwest Department of Haiti provide the following information[16]:

Land Directly Owned by Farmer:	69%
Sharecropped:	5%
Rented:	1%
State Land:	6%
Undivided Inheritance:	18%
Other:	2%

These data were consistent with what we learned from farmers in the three watershed areas visited. Certainly, most fields **are** owned by the land users, and very little is rented. There is enough undivided inheritance land under cultivation on the hillsides to cause problems with creation and management of soil conservation structures and vegetation.

Farmers spoke to us of:

- "Tè achté," (bought land),
- "Te loué", (rented from an individual, could be a relative)
- "Te potek", (sharecropping)
- "Heritage" (inherited) land with formal division,
- "Heritage" (inherited) land without division where the management is essentially that of land mining.

The "tè achté," and the heritage with formal separation are the most secure. In many cases, it is the parcel in heritage with formal separation on which is located the residence (house) of the farmer.

The most valuable land in LaFond is located along the few

---

[16] ADS-II Summary Report, January 1988, p. 20.

small streams which flow for most of the year (except for February/March), where one can find the most trees, including fruit trees, plantain, banana, and good production of cereal crops (corn, beans). There do not appear to be too many very large land owners in this region. Large land owners are considered those with around 5 cx. of land.

There is a large area of State land of over 100 cx in LaFond which has been cultivated for years. In past years, these lands had been sub-divided and sub-rented to other farmers. Prior to Duvalier's fall, people in Bassin-Blue had to pay a rent (eg. $10/year for 1 cx) to the state for this land. An agent came around to be sure this was done. After Duvalier, people have continued to cultivate the land, have planted trees, and put in soil conservation measures. Such land is even passed on to one's children after one's death, and this right is recognized by the local community. Yet they don't have security using this land and would like to be able to officially own it, even if it meant paying something for it. Because it does not belong to them, and everyone knows it, others will come in and cut down trees upon this land, pasture their animals, etc. saying that they have this right as it doesn't belong to the land cultivators. This is a serious constraint for these people and an effort should be made to help them obtain their land rights.

There did not appear to be any State land within the Jacob or Sauval sites, but the land market itself seemed more active in Jacob where small farmers predominate. There are a number of "large" landholders in Sauval possessing between 12-15 carreaux. At Sauval, the team learned of two forms of land rent: the traditional form whereby the user pays a fee to the landholder; and the mortgage form, whereby the landholder obtains money from the user and gives a receipt to the land borrower. In this last case, there is a risk of the landholder actually losing his land if he does not remit the money borrowed within a designated period of time.

2.9.2 Land Values

It is very rare to find land for sale, particularly that located along the streams. Land value is a function of three primary considerations: its fertility, the presence or lack of fruit trees, and the slope. Land located near a stream or gully, with good soil fertility and fairly level, upon which one may cultivate plantain, banana, yam, grow fruit trees, and grow good corn will receive the highest prices. Eroded hillside slopes are the least expensive. Table 17 below illustrates land values in the three areas visited.

Table 17: Land Values: (Gourdes/Carreau)

Category	Sale/Rent	LaFond	Jacob	Sauval
Good Soil Fertility, Little Slope, Near Water	Sale	3,000	N.A.	5,500
	Rent	700/year	N.A.	350/year
Medium Fertility, Some Slope, Farther from Water	Sale	1,200	1,500	2,500
	Rent	500/year	N.A.	N.A.

When land is sold, it is only because the owners have to do so due to an emergency in the family, a death, etc. When land is available, many people show up wanting to buy it. It is the person with the cash who get the land. The only place this much money can be obtained fairly quickly is through the sale of a cow or two. This is the major reason why such animals are considered important to own. If forced to sell some of one's land for such reasons, the first land to go will be the poorest located in the hills, the last to go the land along the streams.

It is possible to sometimes rent good land, but here too, people only rent out such land if they have to, if they have an urgent need for cash. Therefore the person wanting to rent such land has to show up with the cash full payment for the year.

With sharecropping, the share of the harvest that returns to the land owner varies with each area, though extent of yield realized is the significant consideration. At Lafond, the land owner's share can be between 30% and 50%. At Jacob, the land owner's share varies between 25% and 40% of the production. A sharecropper is always looking for ways to increase his share.

Everywhere, farmers, even on the hillsides, noted that land with trees, particularly fruit trees, considerably adds to the value of the land, whether it is rented or sold.

The relatively recent appearance of vegetable gardening, largely through efforts of CARE, has created an entirely new use for land along the streams on plots of very small size. Already people without land along such water (which represents most of the population) are starting to both rent and sharecrop such small fields. Yet there still remains a great deal of land which could be used for this purpose in LaFond and which would greatly raise the productivity of the land. SECID might want to set up a short survey to monitor the relative production and economics of the two kinds of vegetable garden land use (gardens exploited by owners, gardens exploited by renters or sharecroppers).

2.10 Labor

2.10.1 Traditional Forms of Organizing Group Labor

At Lafond, one finds three important traditional forms of organizing group labor: couadi, mazinga, and coumbite.

The "couadi" is an association between friends at a similar social level, where each day a member benefits from the work of all members during a three to five hour period. Number of the members varies between 2 and 10. Because of increasing financial difficulties, farmers prefer a "couadi" with fewer members, being less costly to pay for. During a day, a "couadi" can work two shifts. The second shift is sold to another farmer, or member of group, and the money shared between the members of the labor group.

The "mazinga" is a more elaborate and complex form of labor grouping. Each "mazinga" has a formal organization with a president. The group has some musical instruments (tambour, drums, etc.), that are played during the working of the field. Such a group may number between 20 - 30 people. The "mazinga" work force is contracted out to someone wishing to hire the group for the day.

In the "combite", a farmer invites other farmers with whom he has good relations to come and work in his field for a day. This farmer offers food and alcoholic beverages to his guests. Numbers of people participating varies widely, depending on the financial capacity of the farmer that organizes the work and the number of people who actually show up. In the morning, a breakfast is served to the workers, and at the end of day a dinner is offered.

At Jacob, the most common form for organizing labor is the "couadi". However, the form it takes here show some particular characteristics.

- the couadi has a named leader who organizes the work, and resolves conflicts, if necessary;
- the number of men participating is greater: 4 to 10, and in general 10;
- when work is performed in a distant zone, the field owner is obligated to provide food; if the work is nearby, food is optional.

At Sauval, the "couadi" will have about 10 members; in general no food or alcohol is provided; it can be used throughout the year. A coumbite will have between 10 to 50 members, and food will be served twice during a full day's work, or once for a half day. No alcoholic drinks are provided.

When group labor is performed, the area to be worked is divided into measured sections. Each worker is given his section, which can be of variable size (eg. 100 sq/meters, 200 sq. meters, 400 sq/meters). Activities which are particularly demanding, or land which is particularly hard to work will be divided into the smaller size sections. Each person must complete his section before payment is completed.

2.10.2 Principal Activities

Land clearing/preparation for planting and weeding are the agricultural activities for which these groups are usually formed. Project activities should attempt to introduce soil conservation activities (creation of rock terraces, vegetative barriers, etc.) into the locally accepted activities of local "cuadi" groups. To be acceptable, the size of the group may need to be reduced to 4-5 men who are willing to help each other and who understand the need for such structures on their own land. There is some precedent for this as in Jacob, a "couadi" will sometimes be involved in road maintenance, or help in transporting construction materials for members and friends of the "couadi". In the latter case, food is served to the group members.

2.10.3 Methods of Paying for Labor and Costs

In all three watershed areas visited, payment of workers comes immediately after the end of the day's work. However, in some cases, when there are good relations between labor buyer and sellers, the payment can be made partially (50%) at the end of labor day, with the balance provided some days later (8 to 15 days at Jacob).

Costs of a 3-5 hour "cuadi" work period varies, depending of the period of the year. In peak labor periods (field preparation, weeding, etc), particularly at the beginning of the first agricultural season, labor costs are higher. Labor rates are the same in all three areas, varying between a low of 3 gourdes to a high of 6 gourdes (about $.40)! It is surprising that wages are so low given the highly competitive market.

3.0 Already Existing Farmers Opportunities

3.1 The Cropping System

Lafond

When asked, farmers will say that all their crops provide them with some income. However, beans (white), cowpeas, and pigeon peas are principal cash crops. At this time, the vegetables (primarily

spinach, cabbage, carrots, tomato) being produced by many farmers on the Bio-Intensive Garden (BIG) introduced by CARE seems be the best agricultural opportunities. Calculations for one woman gardener show that this activity gives the greatest return to labor ("valorise au mieux"). This farmer realizes about 60 Gdes for each labor day of 8 hours spent on his BIG. Another farmer in Lafond told us that he has decided to stop cultivating one of his two large hillside fields so as to be able to increase the size of his BIG.

Jacob

Besides the traditional cash crops of beans and cassava, the fronds of the latanier palm tree represent important sources of income for many households. The presence of these trees on the hillsides is one characterizing aspect of the area. The latanier is cultivated for the fronds. Farmers actually raise latanier seedling and plant in fields. These are utilized as roofing material and as a raw material for various handicraft objects made by women and men alike: baskets, harnesses, bags for grain storage, handbags, animal carrying containers (charge), chair seats, traditional beds, etc.

Farmers here have also begun to create BIGs near their homes in spite of the fact that water is much farther away. The importance of the vegetables in supplementing household food is greatly appreciated. A great deal yet needs to be done to fully realize the potential of BIGs here, perhaps through some means of holding water for irrigation near the homes.

Sauval

Pigeon peas (miami variety), cowpeas, and peanuts, are three principal cash crops of Sauval. CARE has not yet begun to introduce BIGs in this area, primarily because of the constraint of water. Yet this could also be extremely important for this area.

3.2 Livestock

Animal production is important in the farming system of the three areas for financial saving and transportation. Sheep seem to be the preferred animal in this system because farmers think it resists water shortage better (than cattle, goats, and pigs) and produces more offspring. Their growth is better than the goat and young can be sold at a younger age.

At Jacob, some effort is being made by the Inter-Aid project to introduce rustic pigs and improve chickens in the area as a means of raising household income. Pigs are present at Lafond too,

in limited numbers, but not at Sauval.

3.3 Other Current Sources of Revenues

At Lafond, beside crop and animal production, the farmers have some other sources of revenue: charcoal production; handicraft, i.e. production of baskets and harnesses, and the raw material for their production; transfer of money from relatives living in abroad; and of labor to others zones (Jean-Rabel, Borgne, Artibonite).

At Jacob, after agriculture, handicrafts produced with latanier fronds is the most important source of revenue, particularly for the women. Charcoal production and the sale of labor at Jean-Rabel are also of important sources of revenues.

At Sauval, livestock is the most important source of revenue after crop production. Indeed, many farmers consider that sheep raising is the most sure activity which would permit a farmer to meet his household's income needs.

4.0 Major Constraints and Possibilities Solutions

4.1 Increased Production of Principal Crops

Availability of water, either through adequate rainfall, or from other sources (streams, wells), is without question the most important constraint in all three watershed areas visited, though Lafond is somewhat more favorably positioned. Soil fertility on the hillsides is also low, with most hillsides exposed to sun and wind, with very little vegetative cover, particularly trees. Following these key constraints, farmers will mention a number of others, including:

- pests on their principal crops: corn, beans, sorghum, peas, and legumes. At Sauval, the "maroca" (worm of cock chafer) represents a serious problem for crops. According to farmers, this insect particularly attacks the roots of the plants (cassava, sorghum, pigeon peas, etc). We were shown many "maroca" when farmers pulled up their millet and corn plants by the roots;

- unavailability of seed for planting: grains, legumes, and tuber cuttings (manioc and sweet potato);

- poor quality of seed for planting: low germination rates, many varieties within the seed mixture purchased in the market place (not all adaptable to area, having come from outside the region);

- varieties with low performance (yields);

- lack of transportation and working capital were principal constraints in the production and marketing of latanier handicraft (JACOB);

- lack of water for vegetable production in the BIGs (this activity is not yet in operation at Sauval).

Confronted with these seemingly overwhelming series of constraints, farmers do the best they can with what they have. For example:

- for pest control (worm/chenille, bruchids), the process used is not very effective (using ashes). Use of insecticides (eg. badigeon) is very rare. When done, it is mixed with water and applied by daubing with a cut off branch.

- in order to obtain good seed, farmers try to stock a portion of their production. This is becoming more and more difficult because many farmers have lost so much of their harvests in recent years. Some varieties are eaten green and never produce seed, thus becoming very difficult to obtain. This is especially true of some important varieties of pigeon pea.

- when farmers don't have seeds, they sell their livestock, which results in a great decapitalization of the farms. This causes an increasing spiral of poverty in which a great many households in Jacob and Sauval find themselves.

4.2 Adopting New Crops

Through various conversations with the farmers we can say that four major constraints exist which impede farmers in adopting new crops:

- fear of risk, linked to their weak financial position;

- lack of technical support;

- no (affordable) credit; There is no appropriate source from which farmers can borrow to finance economic activities in which he would like to participate. Sometimes it is possible to find informal credit locally, whose cost can exceed 120% per year. In some cases, farmers we met were obliged to sell their crops before they were even harvested (Sauval), in order to raise urgent cash.

- low fertility of land cultivated. If farmers could manage the manures of their animals better across the year, they could improve fertility on at least their most important fields.

It must be said that the hostile environment of the Northwest Region, where rainfall if often erratic, assistance to rain-fed agriculture a risky business, at best. Productive short cycle varieties of all crops grown could help farmers under some of these conditions.[17]

4.3 Major constraints to improve animal production

Seasonal feed availability (quantity and quality) constitutes the major constraint in improving animal production. Feed production is higher during the rainy season, but the farmer does not store up grasses for the dry season. Their present strategy is to "store feed" by leaving a field in fallow (with grasses and leucaena) and use it in the dry season. This method has low productivity because the farmers don't use it regularly in wet season (do not cut and carry) and then in the dry season these grasses are dried out and poor or the leucaena is destroyed by direct over-grazing. With better management of their pasture resources, farmers could obtain much better results.

Water is an important constraint for animals as well. In dry season, the requirement for water is higher because animals eat dried feed. At this time, farmers are required to go far from their homes to water the animals, meaning that animals do not always get what they really need (particularly pigs).

Farmers know a lot about their animals but do often lack knowledge about basic notions of feeding and reproduction. They cannot identify feed which have important sources of protein or energy, for instance, or why this is important. Nor do they know how to mix different feeds to obtain the best result. Concerning reproduction, many farmers can recognize when an animal comes into heat, but they cannot predict the next heat or be able to wait for the best moment to breed the females. It would be possible for them to predict the best time to have the birth based, for instance, on availability of feed.

4.4 Other Endeavors

Many farmers say there are other investment opportunities as:
- trade of cloth;

---

[17] With short cycle varieties, the advantage is that if one loses one's crop early enough, one might still have time to replant and still manage to harvest something. The down side is that the crop is generally more susceptible to drought since it does not develop as deep roots or accumulate as much biomass before flowering as do longer maturing varieties. Because the flowering and/or seed filling stage is usually longer in longer maturing varieties, there is a greater chance that such varieties will recover after drought better than will early varieties. Yield potential without fertilizer is also generally lower in early maturing varieties. (Comments from SECID/Auburn University, Dr. Shannon).

- trade of livestock;
- animal production (goat and sheep);
- stocking and commercialization of grains (corn, beans, cowpeas, and sorghum).

Lack of investment capital is the number one constraint for realizing these opportunities.

4.5 Farmer Priority Needs

The following list of either constraints or priority needs (need for capital, new crops, marketing, animal production, other endeavors) are specific topics farmers frequently raised with us during some of our converstations with them.

Beside the obvious #1 constraint that everyone speaks of, water, farmers find it difficult to rank these in some order of importance. "They are all important" they will say. However, it is possible to classify constraints or areas of need according to the relative frequency in which specific issues were mentioned by farmers, as follows:

1. Water (agriculture, and animal production)
2. Working Capital/Credit (all activities)
3. Improvement of Soil Fertility
4. Pest Control for the major crops: corn, sorghum, cowpeas, beans, manioc,
5. Seeds: quantity and quality, low cost, early varieties, drought resistance;
6. Prices Variations for the food grains in the market place.
7. Increase feeding for animal; inadequate supply of appropriate forage during certain times of year (February/March/April).
8. Storage of the food grains (marketing)
9. Technical Support (agriculture and animal production)
10. Improved Means of transportation (marketing).
11. Poor commercialization opportunities.

5.0 Recommendations for Program Interventions/Potential Technologies to Implement

5.1 For PLUS Project

5.1.1 Bio-Intensive Gardens (BIGs)

Lafond

According to all the farmers with whom we met, the BIGs are the best CARE assistance for improving their well-being. Our calculations have confirmed this opinion. It is an activity that allows farmers to minimize the difficulties of the period between the two harvest periods. CARE must go on to promote this activity, and specifically CARE must help farmers find the means for controlling the pests that attack the BIGs.

Jacob

The BIGs do not seem to be as important an activity at Jacob (but CARE has only just started this work here). Farmers think that it is interesting, and many have begun to raise small vegetable gardens near their homesteads, but the distance to the water source represents the major constraint to its development. Yet this area, like Sauval, because of the more critical nature of water availability, are in fact, **even more in need of BIGs** than areas with greater rainfall. BIGs can have an even more profound impact on their livelihoods - for all the reasons why BIGs are important. There are technical means which CARE could consider to help households obtain enough water for such BIGs as well as have some for their animal watering needs. This could be accomplished through construction of below ground holding tanks or cisterns. While this would entail labor and some capital investments by both the households and CARE (depending on types of cisterns created)[18], the long term returns should justify the costs because of the high returns to labor which will be realized. While BIGs are currently considered a woman's activity in Jacob, their success will quickly draw men into this productive activity as well.

In this zone, pest control in the BIGs are absolutely necessary.

For all three areas, it would be possible to significantly improve the fertility of BIG soils (and productivity of plots) throughout the growing season by adding manures. It is easy for farmers to put straw near where the animal is staked for the night

[18] The team believes it would be possible to create small cisterns of at least 10 meters cube (enough to water four 4 meter lengths of vegetable plots through a season) without significant capital expense. The subsoil is calcarious rock and would provide an excellent containment area which could be sealed with clays available in the area. Digging equipment would need to be provided by the project, at the minimum.

and save the litter by adding it with the compost for future BIGs or other important field use. This way, farmers would no longer have to go around looking for animal manures in their fields or along the pathways when they wish to construct their BIGs.

5.1.2 Soil Conservation

Lafond

CARE gives assistance to farmers in various methods of soil conservation: deep tillage/burying, mulching, vegetative barriers, dead vegetative barriers, contour canals, gully plugs, reforestation, etc. The dead vegetative barriers represent the method most adopted by farmers.

Living vegetative barriers, using leucaena, benzolive, medicinier, etc., in spite of their admitted importance by the farmers for livestock feeding in drought periods, (particularly leucaena), have not really been accepted by farmers to the extent that they will be willing to properly manage them. Dead vegetative barriers (rempe paille), a traditional but not widespread practice) should be continued and improved upon. Work within gullies and ravines is very appreciated and should receive much attention.

Animal production, precisely because of low rainfall conditions, holds a much more important and dominant position in the farming systems of all three Northwest region watershed areas visited by the survey team. For this reason, it is particularly important for CARE to realize the importance of creating and managing forage for these animals. In spite of poor acceptance of leucaena and other leguminous hedge rows to date, CARE must not abandon efforts in establishing living vegetative barriers. Better demonstration fields must be established and a number of cooperating farmers provided management training. Leucaena should continue to be made available for such fields, but efforts should be made to integrate better vegetative material farmers already know and use, and which already have an economic value to them. These fields should be located as close as possible to the homestead where they can be watched. CARE should avoid installing vegetative barriers on fields which are not completely owned by the farmer - not rented or inherited without complete rights).

Furthermore, we propose that CARE adopt the "bwadòm", a local plant, in the vegetative barriers (cuttings are self-rooting). The "bwadòm" is used by farmers as forage (regular cutting), and sell the wood each year to artisans that make chairs. Each year a tree can give 15 gdes (at Sauval). Farmers will leave some of the trees to grow larger for wood purposes (2-3 years), while cutting others. Leucaena can also be used in this way, and was observed on a few instances. Closely spaced trees also serve as material against

which dead vegetative material from the field can accumulate.

Jacob

Our survey does not show a preference, among farmers in the area, for any particular soil conservation activity - other than the fact that they have always been acquainted with creating contour dead vegetative barriers made of straw, though not everyone practices this. In general, farmers expressed interest in the various activities they have heard about which CARE will be extending in the area (reforestation, contour canals, vegetative barriers, etc.). Such interest has yet to be translated into concrete activities in the field. Farmers comment that the soil conservation activities suggested by CARE technicians are hard, and without some "encouragement" they can not realize much of this work. In this regard, it should be noted that the Ministry of Agriculture had a major soil conservation program in this region years earlier (contour canal, leucaena, etc.), in which work gangs were hired from area to accomplish work (paid by linear meter). People very much needed then, and still need, the money this represented - and at the time appreciated the soil conservation work principally for the money it brought in as a 'salary'. This approach is of course to be avoided, but will be an obstacle to convincing farmers to do similar work, without monetary "encouragement".

Clearly, CARE will need to initiate a major campaign to motivate people to manage their cultivated lands. This can only happen, however, if the productivity increases represented by such efforts can clearly justify labor inputs. We doubt that productivity increases of hedgerows to the land itself, in terms of increased crop production (ie. through higher soil fertility) will be enough to encourage farmers to adopt and maintain these.[19] The only way productivity increases may be realized will be through passing the forage through an animal, such as the sheep and cattle of the zone. Therefore, it is difficult to see how CARE can avoid not considering the livestock impact of their programs if soil conservation remains an important objective. Other recommendations made for LaFond also apply here.

---

[19] In one sense, the arguement here is not so much a technical one, in that, technically, it is probably true that farmers would see an increase in their corn production if they, in fact, would have appropriate leucaena hedgerows, and if, in fact, they prunned these regularily and incorporated this into the soils. But to do such activities regularily (to prevent leucaena expansion from seeding) and to perfor this labor seems to be a major problem. What seems to happen is that when a field is planted with hedgerows (eg. leucaena), it will be used for direct grazing until it is gone.

Sauval

CARE has only just begun activities within the Sauval M/E site selected, including initial efforts in soil conservation activities. Farmers are eager to learn from the program technicians. Recommendations for both LaFond and Jacob apply equally here. Perhaps because the Passe Catabois area has an even greater water problem, program efforts in this regard will be even more important and have greater impact on farmer well-being. Certainly something like cistern development is crucial.

5.1.3 Monitoring and Program Indicators

CARE could establish a more effective system of program monitoring than we observed in the field.

- monitoring of works of soil conservation: costs (money, labor time), increase of production. Knowing the number of fields benefiting from rock terraces (and meters); knowing the number of rock walls and vegetative structures placed into ravines and gullies are all important. Crop production increases, as well as new crop production opportunities (eg. plantain, banana, corn) may be made possible from such structures. The survey team does not believe fields benefiting from creating of dead vegetative material along the contours (rempe paille) should be counted or measured as the length of time they will be in the field may be less than one season (and thus a waste of time). If such barriers are established with leucaena or some other living barrier, then they could be measured for purposes of AID progress indicators.

- Between 15-20 BIGs should be monitored closely throughout the year, providing production amounts, sales, prices, expenses, labor time, etc. Each selected farmer should have a notebook to record the data (recorded by either farmer, a member of household, or technician). These BIGs should be part of a research/demonstration trial effort to be discussed below.

- monitoring of prices of major produce (output of BIGs, most important food grains) to keep aware of commercialization issues;

- monitoring of farmers that adopt the vegetative barriers (leucaena) to know the reasons for this decision, why the maintenance is not done (if necessary);

- monitoring of some farmers that do not adopt the technology of soil conservation to know why, and to study their constraints.

5.2 Potential Programs

Two types of programs are proposed, general programs and specific program:

5.2.1 General Programs

(1) **Pest Control**:
This program would aim to fight against the major pests that attack the main crops of the zones. These crops are corn, sorghum, beans, cowpeas, pigeon peas, and peanut (Sauval). And these pests are caterpillar, bruchids, "maroca", and birds (Jacob). Such a program would have two approaches:

- a first approach where CARE with its field agents would obtain equipment and supplies for farmers to use (especially for BIG farmers);

- a second approach where CARE staff would try to locate and assist merchants in the area to be able to provide the needed equipment and supplies, locally.

A number of field workshops/seminars should be conducted with farmers on the subject of pest management.

(2) **Stocking of the Grains**:
It is important to develop some form of food grain storage system within the area, preferably at the individual household level, to help farmers hold on to their produce until prices rise a few months later. Because sales at harvest are linked to urgent need for cash, some form of locally organized cooperative to loan money for in return for produce deposited into the storage building (for later sale) would be useful. Such a grain storage system would also help make available food grain seed which can be used at time of planting, without having to repurchase seed at the time of year when market prices are highest. These storage facilities would have to be controlled by the farmers. CARE would bring initial start-up capital, and training in grain storage management.

(3) **Working Capital**:
Many farmers say that they would undertake activities other than agriculture, but the lack of funds is always the constraint. Farmers could profit from diversification of activities if some form of credit fund existed that should be utilized for buying livestock to fatten, or to breed (sheep, and goat), grains to stock, raw materials for handicraft production, etc.

(4) **Research/Demonstration**:
Install demonstration plots to test early crop varieties, improvement in quality and quantity of forage for animals, and drought resistant crop varieties. Key crops for such research

would include: sorghum, cowpeas, pigeon peas, peanut (Sauval), and beans.[20] We also recommend that demonstration trials be developed for the establishment of vegetative barriers. Because corn/sorghum production remains so important to the production to many farmers, our team was concerned that some program address this area. An on-farm applied trial theme developed by the survey team in Les Cayes could be appropriate here. This trial, with some modification, would include leucaena/grasses and trees as principal components of vegetative barriers for many Northwest Region farmer fields. This is presented in Appendix 4, as developed in Les Cayes.

(5) **Supply of Seeds**:

When drought provokes the loss of the harvests, CARE could systematically help farmers find seed for planting. A more long-term solution would be assistance with food grain storage, mentioned earlier.

(6) **Soil Conservation Incentive (Subsidization)**:

The work of soil conservation is hard, say farmers, and "without help we cannot accomplish some of the activities suggested". Though CARE will not want to become involved in 'paying' farmers (by linear meter) to construct more permanent soil conservation structures in their fields, CARE should be able to help provide some of the vegetative material needed. The survey team also would recommend that CARE consider, within each zone, to announce a yearly contest, with 4-5 possible "winners" (1st to 5th place) who would receive some kind of 'prize' for having achieved the best demonstrations of soil conservation measures on their hillside fields. Such 'prizes' could take various forms (a cow or pig, sacks of food grain, monetary, etc.) as is frequently done in county fairs in the United States and elsewhere.

(7) **Livestock program**:

Animals hold a central role in the farming systems of all three watershed areas visited. It is essential that CARE attempt to integrate an animal component into their program. Feed availability depends on the agricultural production and the space allowed for fallow. Vegetative barriers must be promoted with a clear idea of how they will be used by specific household livestock operations. With agricultural intensification, with the BIGs for example, more space could be opened for animal production (as farmers leave some extensive, hillside slopes for intensive and more productive BIGs) and the project should anticipate animal forage needs and productivity to avoid over-grazing or destruction of conservation soil structure. Intensification of animal production could result in fewer animals, but result in more money

[20] We have not mentioned corn, in spite of its importance, because of the difficulty in controlling the pollination issue for any new varieties which might be found to be good. Once extended, in a few years its usefullness would have disappeared through cross-pollination from other local varieties.

earned from animals[21].

(a) Improving feed quantity and quality

In all three watershed areas, farmers cultivate grasses in their fields and sometimes as part of a crop association - specifically as a source of forage for their animals. However, the quantity isn't sufficient to meet dry season needs. It might be possible to associate grasses (eg. guinea or others) and leucaena by creating permanent vegetative barriers on hillside fields to increase the availability for such feed (cf. Appendix 4). Yet good demonstrations of this are not available for farmers to observe and evaluate. Furthermore, once available, it is important to show farmers how to daily mix leucaena and grass to improve the quality of the feed given to animals. The animal would have a source of protein (leucaena) and a source of energy (grass).

(b) Learning program

It is important to give farmer seminars to demonstrate basic notions about animal feeding and reproduction. Farmers need to be informed about the importance of balanced protein and energy diets for their animals - and how to accomplish this on their own fields. Such training would include teaching farmers various reproduction phenomena of principal animals kept in order to help them better manage birthing periods. We have found that few farmers understand the reproductive cycles of their animals and they can not predict the next heat or the best moment to breed their animals.

(c) Monitoring program

No specific information exists about animal production in this region. If possible, acquiring information about animal feeding, health, growth, and commercialization of the principal animals (sheep, goat, and cattle) would be valuable for developing future activities in the region. Part of this information should be acquired as part of the BIG activities we are proposing as a 'unifying theme' below.

5.2.2 Specific Programs

(1) **Water for Legume Production**:

Serious consideration should be given to creation of new water sources to serve both BIGs and household livestock needs. CARE should consider assistance for (below ground) cistern development, as already described, perhaps combined with improved construction (in Sauval) of the collecting 'ponds'. At Lafond, CARE might

---

[21] Farmers currently think in terms of increasing the numbers of their animals as best ways to increase livestock incomes. However, increasing the quality of animals raised with improved management (including cut-and-carry forage) can accomplish the same goal, with less negative impact on the already overgrazed hillsides - contributing to erosion.

consider some kind of short term credit to permit some farmers to rent plots for BIGs near streams with flowing water. At Sauval, farmers already attempt to catch run-off rain water in shallow basins, dug out for this purpose. Here, CARE might provide technical assistance in improving these basins[22]. Perhaps a form of below ground cisterns, as proposed earlier for the other sites, would also be more realistic and provide long term solutions here as well.

(2) **"Latanier" Marketing**:

The "latanier" palm tree gives two types of fronds: normal (adult) ones that are green (12 a year) after drying, and immature fronds which are white (1 to 2 a year) after drying. The later are sold at a higher price (.67 gdes vs. .25 gdes each frond). The white baskets created from the white fronds bring a much better price as a result. CARE might consider exploring whether or not some simple (and cost effective) technique might not exist to show these farmers how to bleach the green leaves, creating white ones. This would be an important new source of revenue for numerous household women that work with this material. Furthermore, the latanier, as vegetative cover on hillside fields, could be further encouraged and expanded. Appendix 3 provides some information gained about the economics of latanier transformation activities. Table 18, below, summarizes some of the major constraints discussed earlier with possible solutions.

[22] At the very least, they need to be much deeper and to have a means of holding the water longer, with less loss to soil infiltration and surface evaporation.

Table 18: Matrix of Major Constraints

FARMERS CONDITIONS	MAJOR CONSTRAINTS	POSSIBLE SOLUTIONS
Low yearly crop yields resulting in sale of animals (sheep and goat) to meet family needs and purchase seed grain and labor for next season fields.	Water availability [23]	Promote cistern/pool water catchment areas in Jacob and Sauval, improve those existing in Sauval. Promote early sorghum and millet cultivation in first and second seasons in the three areas.
	Pests: caterpillar on corn, manioc, sorghum, B.I.G crops; mahoca on all the cultivated crops at Sauval	Provide through agroforestry program neem kernel extract as insecticide/pesticide. Organize seminars for farmers about pest management.
	Crop variety adaptability	Research and promote early improved crop varieties of pigeon pea, cowpea, manioc, sorghum and corn.
	Soil fertility	Promote as soil conservation adapted vegetative barriers (gliricidia, leucaena, grasses, bois d'homme,etc.) that can be used for animals feed. Encourage use of animal manures particularly in BIGs.
	Unavailability of seeds and higher cost of grain in sowing period.	Encourage grain and seed storage. Develop seed bank programs.
Animals lost because of dogs and dry season	Pasture far from household	Encourage farmers who own many goats and sheep to create enclosures to protect animals from dogs (at night) and to increase manure storage for BIGs and other fields.

[23] In Lafond, water is available along a number of small streams. Water is less available in Jacob, and in Sauval, water availability is at its worst (among area visited).

5.3 A Unifying Theme for the Three Micro-Watersheds of CARE's Northwest Regions 2,3, and 4: BIO-INTENSIVE GARDENS

The farmer needs assessment team would recommend that the PLUS project (CARE and SECID) together adopt the following unifying theme approach to permit more efficient joint collaboration of the program on a more focused series of activities. Table 19 below lists a number of the components that should be integrated in this approach, the farmer constraints they address, and the specific CARE project actions which might be taken to implement the recommendation. This is not to say that other activities would not be conducted, and other data collected, but that because farmers in this region have clearly targeted these activities as key to their lives, more concerted, organized, systematic attention must be given this theme. Our observations concerning the BIGs and the components related to it revolve around a series of assumptions and hypotheses established when in the field meeting with these farmers.

5.3.1 Assumptions and Hypotheses

(1) BIGs represent the agricultural activity with the greatest return to labor and capital farmers in this area can engage in;

(2) BIGs meet critical household consumption needs with much less risk than production risks associated with any other agricultural activities. Part of the reason for this is their size, productivity per unit of land, and fact that they will receive at least **some** water, even if it doesn't rain;

(3) BIGs will reduce the pressure on marginal land on the hillsides presently under cultivation because farmers will transfer their labor resources to BIG activities;

(4) Need for fertilizer for increased production on the BIGs (and elsewhere) will encourage better care/storage of and use of animal manures;

(5) Whenever rock terraces or gully plugs can be created, this should **always** be done. Great attention should be given that at least these soil conservation structures are created. This will require, in some cases, organizing farmers along the entire length of a gully, not an easy matter. While rock terraces, in themselves, do nothing to improve soil fertility, they do create areas of much higher fertility immediately on the up-hill side where field nutrients and soil loss between terraces accumulates with field organic material. And, in areas where soils are loose or gravelly, it can be important to also place some kind of vegetative barrier (of crops farmer cultivates) below to keep terrace from being undercut. This material could also improve soil fertility over time.

(6) Vegetative barriers (leucaena, guinea grass, dead vegetative strips along contour, etc), on the other hand, will not increase hillside agricultural production (through increased soil fertility) of crops cultivated there[24]. We suspect that the only way that an economic benefit may be realized will be through cycling the forage produced through an animal. In the case of this region, the ideal animal is the sheep, as it is the most common (eventually sheep will be traded up to cattle). It is not worth establishing vegetative barriers with farmers unless the project plans to **clearly establish with farmers the link with these animals and work to make this link happen.**[25] This requires on-farm research/demonstration with a group of cooperating farmers as proposed in the BIG unified approach described below in Table 19.

(7) More money coming in from sale of BIG produce will result in more money being invested by these households in sheep. This will lead to increased need for forage which can be met for increased production and better management of the hillside vegetative barriers. Sheep intensification activities will be needed (cut and carry), preservation of manures for BIGs and other fields, better management of the sheep herd, resulting in even greater productivity. This will help farmers regain some of the security they have lost in recent drought years, helping them to rebuild their herds and diversify.

(8) CARE's strategic decision to concentrate on the "areas of opportunity" within the difficult climatic conditions of the Northwest is a wise step. The BIGs represent a first important step in this direction but must be consistently and completely developed. Components of seed availability, sustainable sources for seed and commercialization outlets **MUST** be given high priority. This is necessary if more than a few households are to benefit through more than improved consumption, itself a significant achievement, if realized. Water needs, representing the key constraint, require that help be provided in establishing new sources of water capture. Potential health hazard from malaria and other water born infections must not neglected.

(9) For BIG development in Jacob and Sauval, a most important activity will be to initiate assistance in constructing (digging) deep below-earth cisterns (cf Figure below) located at strategic locations near households planning to do such gardening - where it can benefit from the maximum of water run-off from a slope above the home. Ideally the water falling upon the home itself and hard (often rock surface) exposed area around the homestead should be

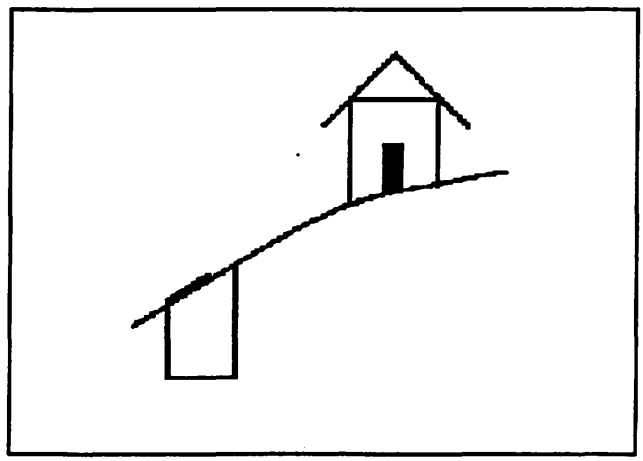
---

[24] We say this not because it would not be possible technically to do so, given proper management, but because it is highly unlikely to happen, given pre-occupation with livestock in this area. Unlike rock walls, vegetative barriers will not create the accumulating soils characterized by such structures.

[25] See appendix 4 for an on-farm trial developed in Les Cayes which could also be appropriate to improve soil fertility of the major productive fields of farmers (food grains).

collected where it runs off. The size of the cistern itself should be made to meet the water needs of at least a garden of four 6m X 1.2m raised earthen plots (29 m^2), plus double this size to cover for leakage and probable use for animals as well. The calcarious sub-soil of this area would make an ideal container which could be plastered with some kind of material to make it water tight. The purpose of these reservoirs would be for watering gardens, though it is likely that the household might use some of this for domestic purposes. Even if some cement should be required for construction, such assistance should be seriously considered.

Figure 4: Below Ground Cistern



(10) Animal manure might be better collected for gardens by creating a very simple manger near the house. Though farmers have not shown much interest in this concept to date, those with vegetable gardens might become more interested and willing to link this to their gardening activities. One would need to consider the implications of more intensive livestock proximity on animal health.

(11) A link should be made to the hillside fields of BIG farmers for the forage needs of their animals whose manures are so important to the BIGs.

5.3.2 Bio-Intensive Gardens

Table 19 below outlines our recommendations for this unifying theme, which integrates ten project components, addresses many of the key constraints and farmer needs discussed, and suggests specific project actions to be taken.

Table 19: A Unifying Theme for the Three Micro-Watersheds of CARE Northwest

UNIFYING THEME	COMPONENT	CONSTRAINTS TO BE RESOLVED	PROJECT ACTIONS TO BE TAKEN
BIO-INTENSIVE GARDENS (BIGS)	1. Household Food Consumption	Critical Food Supplement, Especially between major crop harvest periods.	Promote wide-spread adoption
	2. Seeds: Commercialization	Lack of Seed; Greater diversity of seed available; Seed source stabilized and Employment Generated; Area not dependent on project source of seed.	Set up several small enterprises (women) merchants to sell seed; Possibly provide loan to start-up; Help develop contacts with outside seed sources; Help BIG households learn how to preserve their own seed.
Spinach Cabbage Lettuce Tomatoes Eggplant Carrots Pois Souche (lima bean) Canteloppe Melons Watermelon	3. BIG Production: Commercialization (Key Constraint)	Reduce Risk of Over-supply in Local Markets; Diversify locations where produce may be sold.	Obtain wide range of vegetable varieties and dates of maturity; Help BIG farmers
	4. Basket Making: Commercialization	Poor Quality of Produce arriving at distant market (papaya, Francisque mango, eventually melons, etc.)	Help develop cottage industry in making appropriate containers from latanier leaves for long distance transport.
	5. Water: (Key Constraint)	BIGs often located at considerable distance from water, which is transported by children or a donkey; Few farmers have close access to streams; Insufficient water given to BIGs; Water a problem for livestock too.	Promote construction of very simple, below ground cisterns (low cost - without cement) to catch run-off from household yard; Train in more efficient means of BIG water use (evening watering; soil cover).
	6. Manure	Low soil fertility resulting in lower yields.	Demonstrating, through trials, importance of using animal manures; Advise BIG farmers on animal enclosures and staking for gathering manure; Improve manure quality through means of protection from sun/rain.
	7. Forage Crops	Farmers have critical need for animal forage for sheep and cattle; Money from BIGs will be used to purchase additional sheep = greater need for forage.	Farmers with BIGs should create vegetative barriers on hillside fields using guinea grass, leucaena, latanier palm, & other herbaceous legumes[26] on contours on at least ONE of their major OWNED fields (with project help). Farmer will take measures to protect forage strips when fields are not in use.
	8. Pest Management	Extensive insect larval damage to vegetables; Reduced quality of product resulting in lower prices.	Instruct in methods to use neem kernel extract as an insecticide on BIGs; Collect neem seeds in area, if available, with BIG farmers; Encourage BIG farmers to plant neem trees.

[26] Eg. siratro, glycine, teramnus.

BIO-INTENSIVE GARDENS (CONTINUED)	9. Agroforestry	Hillside soil conservation for serious erosion, need for cover crops; forage for livestock; increased water infiltration; increased food for consumption.	Availability of neem, guinea grass, latanier palm trees for contour strips on hillside fields of BIG farmers. Establish nurseries with latanier palm seedlings for these hillside fields.
BIO-INTENSIVE GARDENS (CONTINUED)	Project Information Needs for Monitoring and Evaluation	Data Collection on the 10 components of the BIG unifying theme for M/E purposes; objective to quantify benefits of system.	Data on BIG farmer use of time, water, and amount of produce sold and consumed; Data on costs of constructing simple cistern; Simple manual on preparation of neem kernel extract for application to BIGs and method of application; If small business set up for sale of BIG seeds, then collect data on numbers of farmers requesting seed, where they are from (extension), periods sought, varieties requested and purchased, and economics of business; Data on timing and quantity of forage obtained from BIG farmer fields, and monitor BIG livestock, destination of all manures; Select 10 Cooperating BIG Farmers per Micro-Watershed for this M/E Data Collection.

The BIG theme developed in Table 19 above should be tested out with SECID and CARE joint efforts among at least 20 households within the region, and ideally 20 within each of the watershed areas visited for M/E activities. The point of the 'unifying theme' is that CARE will develop all the different components among all the 20 households at the same time; and that this should become one of the key themes for monitoring for AID project indicators of success: these are the issues that concern farmers most and which have the greatest likelihood of both short and long term productive gains for these farmers.

Appendix 3 provides some data on what one woman in Lafond was able to do with a small BIG garden for which she, herself, has kept records. Verbal accounts from other farmers interviewed support the income gains these figures demonstrate. Appendix 5 provides some photographic view of some of the gardens observed.

APPENDIX 1: CROP ASSOCIATIONS AND FREQUENCY

Appendix Table A1: CROP ASSOCIATION AND FREQUENCY (JACOB)

ASSOCIATIONS	CROP number	FIELDS number
corn	1	8
manioc	1	1
fallow	-	5
pigeon pea	1	1
corn, pigeon pea	2	5
corn, sweet potato	2	6
corn, banana	2	2
corn, bean	2	1
corn, manioc	2	4
corn, pigeon pea, sweet potato	3	2
corn, pigeon pea, sorghum	3	2
corn, pigeon pea, manioc	3	5
corn, pigeon pea, grass	3	2
corn, pigeon pea, lima bean	3	1
corn, manioc, sweet potato	3	1
corn, pigeon pea, sugar cane	3	1
corn, pigeon pea, plantain	3	1
corn, manioc, sorghum	3	1
corn, tobacco, squash	3	1
corn, pigeon pea, manioc, sorghum	4	1
corn, pigeon pea, manioc, sweet potato	4	2
pigeon pea, manioc, sweet potato, lima bean	4	1
corn, pigeon pea, sorghum, sweet potato, lima bean	5	1

TABLE A2: CROP ASSOCIATION AND FREQUENCY (SAUVAL)

ASSOCIATION	CROP number	FIELDS number
corn, grass	2	1
corn, squash	2	1
corn, pigeon pea	2	5
corn, cowpea	2	2
pigeon pea, manioc	2	1
pigeon pea, grass	2	1
corn, sorghum	2	1
manioc, sweet potato	2	1
peanut, water melon	2	1
corn, pigeon pea, sorghum	3	4
corn, pigeon pea, manioc	3	2
corn, pigeon pea, squash	3	1
corn, pigeon pea, grass	3	4
corn, pigeon pea, cowpea	3	1
corn, plantain, sorghum	3	1
pigeon pea, manioc, sorghum	3	1
pigeon pea, sorghum, sweet potato	3	1
pigeon, sorghum, mil	3	1
pigeon pea, lima bean, mil	3	1
manioc, sorghum, squash	3	2
corn, manioc, cowpea	3	1
corn, sorghum, mil	3	1
manioc, cowpea, mil	3	1
corn, pigeon pea, manioc, squash	4	1
corn, pigeon pea, manioc, grass	4	1
corn, pigeon pea, manioc, mil	4	1
corn, pigeon pea, squash, mil	4	1
corn, pigeon pea, manioc,sweet potato	4	1
corn, pigeon pea, manioc, sorghum	4	2
corn, plantain, caster bean, grass	4	1
corn, pigeon pea, grass, sweet potato	4	1
corn,pigeon pea,manioc,sorghum,squash	5	1
corn, pigeon pea, manioc, sweet potato, cowpea	5	1
corn,pigeon pea,mil,lima bean,squash	5	1

corn,sorghum,manioc,pigeon pea,squash	5	1
grass	1	2
fallow		1
"racks"		1

TABLE A3: CROP ASSOCIATION AND FREQUENCY (LAFOND)

ASSOCIATIONS	CROP number	FIELDS number
corn,pigeon pea,sorghum	3	5
corn,manioc,sorghum	3	4
corn,pigeon pea,sorghum,bean	4	2
corn,pigeon pea,sorghum,manioc	4	2
corn,sorghum	2	2
pigeon pea,sorghum	2	2
plantain,sugar cane	2	2
corn,bean	2	1
pigeon pea,manioc,sorghum,sweet potato,cowpea	5	1
cowpea, sweet potato	2	1
cowpea	1	1
guinea grass	1	1
sugar cane	1	1
plantain	1	1
corn,pigeon pea,manioc,sorghum,cowpea, bean,grass,lima bean,squash	9	1
corn,manioc	2	1
corn,pigeon pea,sorghum,cowpea	4	1
corn,cowpea	2	1
corn,pigeon pea,cowpea	3	1
corn,manioc,lima bean,caster bean	4	1
corn,pigeon pea,manioc,lima bean, sweet potato, grass	6	1
pigeon pea,manioc,sorghum,lima bean,grass	6	1
pigeon pea,manioc, sweet potato	3	1
corn,pigeon pea,manioc,bean,swt. potato,grass	6	1
corn,pigeon pea,lima bean,sorghum	4	1
bean,plantain	2	1
corn,pigeon pea,manioc,plantain,sweet potato	5	1
cowpea,lima bean,sorghum,manioc,tobacco	5	1

APPENDIX 2: TRANSFORMATION AND COMMERCIALIZATION OF LATANIER PALM FRONDS

Latanier palm trees are important components of the crop associations in many fields in the Barbe Pagnole and Passe Catabois areas, and represent important sources of supplemental income for women. There are many ways in which this cottage industry might be encouraged and expanded. Below, we have provided figures, given by one woman, concerning transformation and commercialization costs and returns of 25 dozen baskets. Twice this much can be made and sold each month by one woman.

1. Basic Unit Outputs: 25 Dozen Latanier Baskets (representing one shipment to Port-au-Paix)

2. Cost of Production of Green Baskets:
   Purchase of leaves: 110 at 0.25 gdes: 27.50 gourdes
   From these can be made either:
   (a) Big baskets: 96 at .5 gdes 48 gourdes
   or (b) Small baskets: 96 at .4 gdes 38 gourdes

3. Cost of Production of White Baskets:
   Purchase of leaves: 5 doz (60) at 8 gdes 40 gourdes
   From these can be made either:
   (a) Big baskets: 54 at .75 gdes 22.50 gourdes
   or (b) Small baskets: 54 at .60 gdes 18 gourdes

4. Total Purchase Costs (27.5+40): 67.50 gourdes
   Total Sale (48+38.4+22.5+18): 126.90 gourdes
   Gross Return (126.90 - 67.50): 59.40 gourdes

5. Labor Required:
   (a) Making of Baskets: 3 doz/day: 8 days
   (b) Time to take to Port-de-Pais to sell: 2 days

6. Net Returns per day: 5.94 gourdes/day worked[27]

[27] When compared to the wage a man earns in a day of hard labor locally in group work of 5 gourdes/day, this is a reasonable return. The returns might be higher with improved material.

Appendix 3: Bio-Intensive Garden of One Lafond Woman Gardener

1. Vegetables grown: Cabbage, okra, spinach, beets, carrots, lima beans, tomato, peppers.

2. Period of Activity: Between December 13, 1992 and March 13, 1993.

3. Area of Garden (4 bands): 130 meters square

4. Expenses:

Land Preparation (she hired labor):	34 gourdes	
Use of Pesticides (Sevin):	5	
Seeds: (cost here does not include her own seeds used)		
Carrots:	6	
Beets:	12	
Cabbage:	3.50	
Spinach (Amaranthus):	1	
Total Expenses:		61.50 gourdes

5. Sales:

Cabbage leaves (Feb 15 to June 16)	96.25	
Okra (began Feb 6)	40.90	
Spinach (began April 2)	140	
Beets (began April 3)	92	
Carrots (began March)	90.5	
Lima beans (began June 3)	58	
Cabbage Heads (began April)	80.70	
Tomato (began May)	39.90	
Pepper (began June)	42	
Total Sales (to date)[28]		680.25

This woman also claims to have consumed about 25% more of her produce, which we calculated with her to be worth 228 gourdes.

6. Gross Production (680.35 + 228) 908.35

7. Net Returns (not including cost of her own labor) 846.85

8. Return to Labor: We calculated with gardener that during the past 6 months she has worked an equivalent of 13 man/days at 8 hours/day. This would give her a return to her labor at 65 gourdes a day. This is a good return when compared to the daily labor rate in Lafond which varies between 3.5 - 6 gourdes/day for men working in field activities (field preparation, weeding, etc.).

[28] Field continue to produce. Spinach are cut at base of plants, and grow again. Peppers, okra, and tomato continue to produce.

Appendix 4: A Unifying Theme for PADF Watersheds in Jacmel Region 2, and CARE Northwest Region Watersheds

Table A4. UNIFYING THEME: Leucaena/Napier Grass, Combined with Trees, as Principal Components of Vegetative Barrier With Long Term Manioc/Sweet Potato Ridges as Formal Component of Association

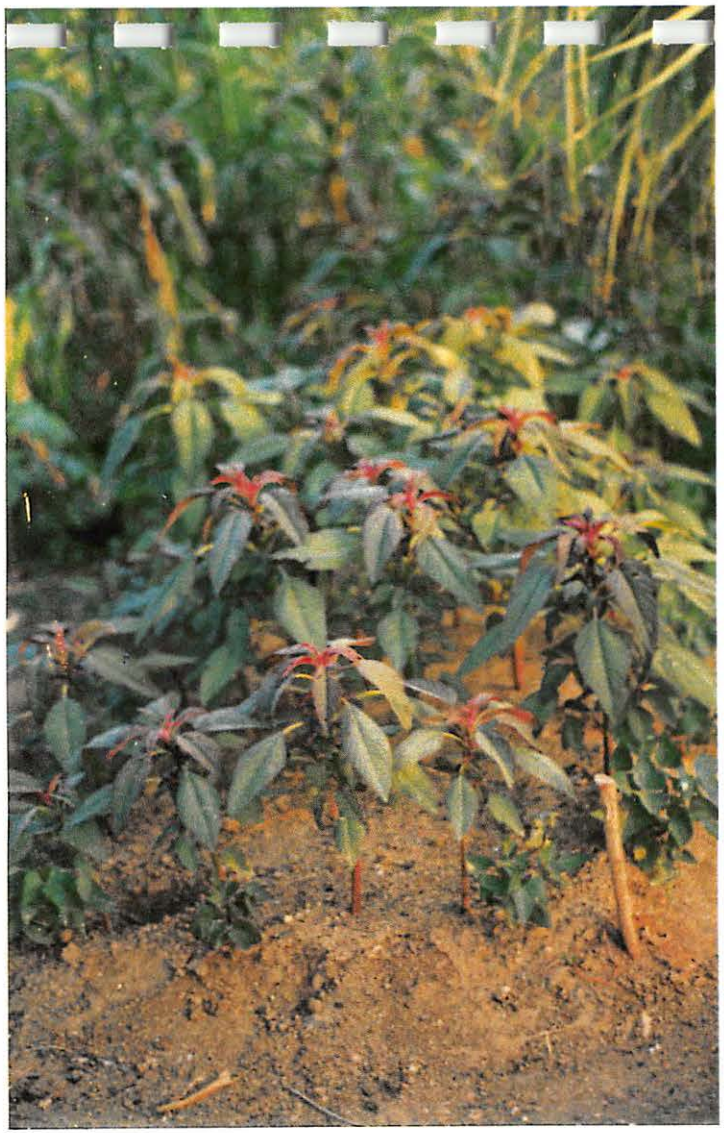
UNIFYING THEME	COMPONENT	CONSTRAINTS RESOLVED BY ACTIONS	PROJECT ACTIONS TO BE TAKEN
Hillside Cropping Associations: Crop Rotations Between: (1) Corn/Sorghum/Bean Pigeon Pea; (2) Short Fallow; (3) Manioc/Sweet Potato with Vegetative Bands of: Leucaena and Napier Grass (close parallel rows) with Bois blanc tree seedlings (every 2 meters) and Some Castor Bean Some Gliricidia Some Coconut Trees Some Other Trees	Household Food Consumption	Produce from area between vegetative barriers reserved for most important food crops.	Establish at least 20 on-farm, farmer managed, research/ demonstration trials with this unifying theme. Assist other farmers in area to establish these, if interested.
	Soil Conservation	Increased vegetative cover of hillside fields, reduced soil erosion, increased water infiltration, increased productivity of hillside fields.	Establish shallow contour ditches along contour, creating small soil ridges, into which are planted both one row of leucaena and one row of napier (on up-hill side).
	Agroforestry	Increased vegetative cover and long term productivity of hill-side fields.	Encourage farmers to select a number of both fast growing trees (bois blanc, bois capable), coconut tree seedlings (project supplied), castor bean, and other tree species to include scattered along the vegetative barriers. In furrow, plant every 2 meters tree seedling. Include castor beans (plant seed every 2 meters. Initially supply farmers of 20 trials the seed/plant material; initiate seedling development in nurseries for extended adoption.
	Animal Production and Forage	Need for forage material for increased animal production, higher quality feed for animals is particularly high in these regions; space is limited for animal pasturing	Forage material coming from the vegetative strips can become an important new source of feed, using cut-and-carry. No direct field pasturing.
	Marketing	Low productivity of hillside fields will be modified with higher production from protected soils; vegetative barriers will produce new crops (castor bean, lumber, fire-wood); increased manioc cultivation will generate new revenues.	Establish alternating crop production zones between the vegetative barriers; Band One with corn/bean/sorghum/pigeon pea; Band Two with sweet potato/manioc on contour ridges; every other band should always be in a field of manioc/sweet potato - providing long term vegetative cover and some protection from direct grazing by animals on part of each vegetative barrier. Provide assistance, where needed, in marketing key crops, seed banks, improved varieties, etc.

	Agro-Industry	Farmers are not realizing what they might from the production of key crops. Incomes remain low and motivation to increase production thus limited.	Search for means of product transformation of key crops grown in vegetative barriers. consider improved means of processing castor beans; consider assistance in establishing cassava processing cooperatives.
	Project Information Needs for Monitoring and Evaluation	Lack of objective data on soil conservation measures which will significantly both raise hillside farming productivity and result in soil conservation and farmer sustainability.	Obtain detailed data on the 20 participating farmer fields concerning all activities undertaken, timing, costs, and production. Use of forage for animals. Value of animals benefiting.

Appendix 5

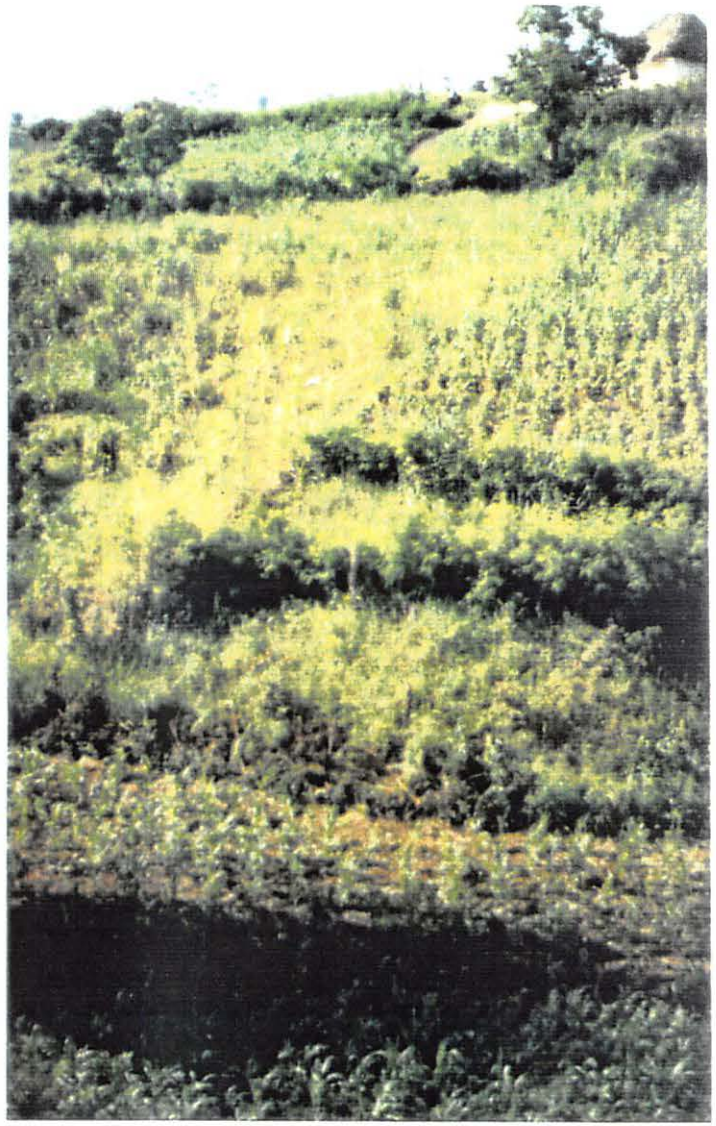
Photographic Overview of CARE Regions 2,3, & 4

1A: LaFond. June. Small streams in the area are increasingly used for Bio-Intensive Gardens (BIGs)



1B: LaFond: BIG near stream with enclosures to protect from numerous livestock, particularily sheep.
1C: Jacob: Spinach in BIG's are cut near base and regrow again several times in one season, providing produce for both marketplace and household consumption. Spinach most often grown traditionally on spot where charcoal was prepared in earlier months.

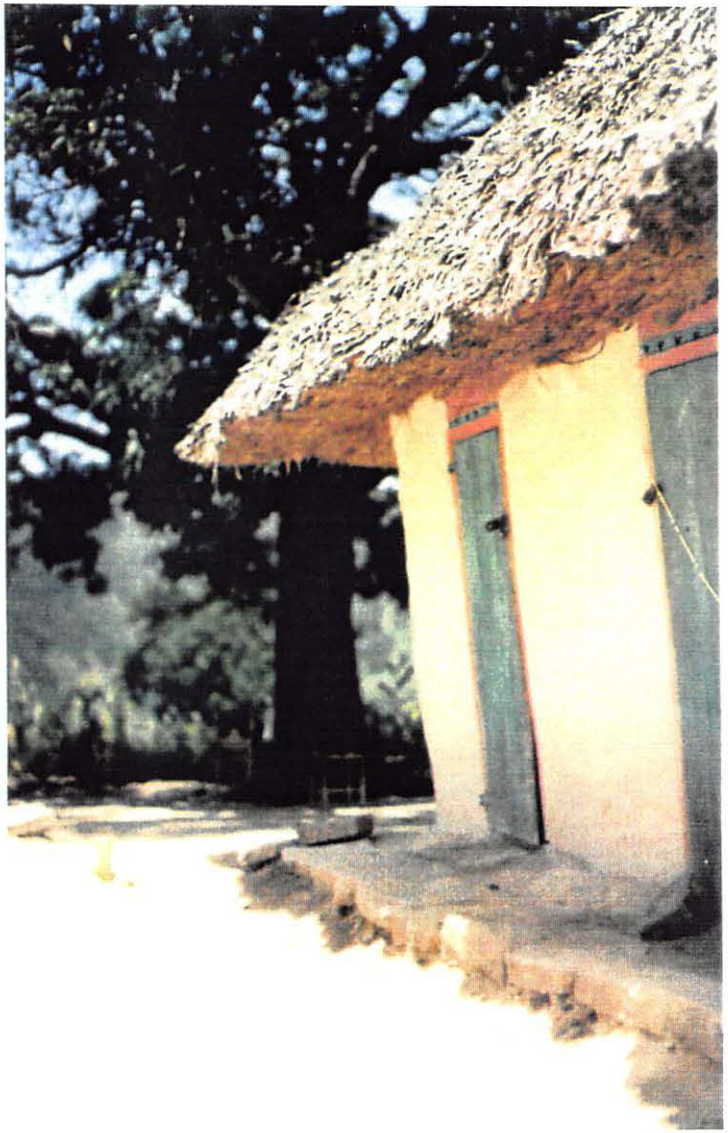
2A: LaFond. June. Enclosed with barbed wire, the pasture at right shows extent of over-grazing outside enclosure.



2B: Barbe Pagnole. In distance, one may see leucaena hedgerows of an Agro-Forestry II project farmer participant.

2C: LaFond Only a couple of poorly spaced rows of leucaena remain on this slope.

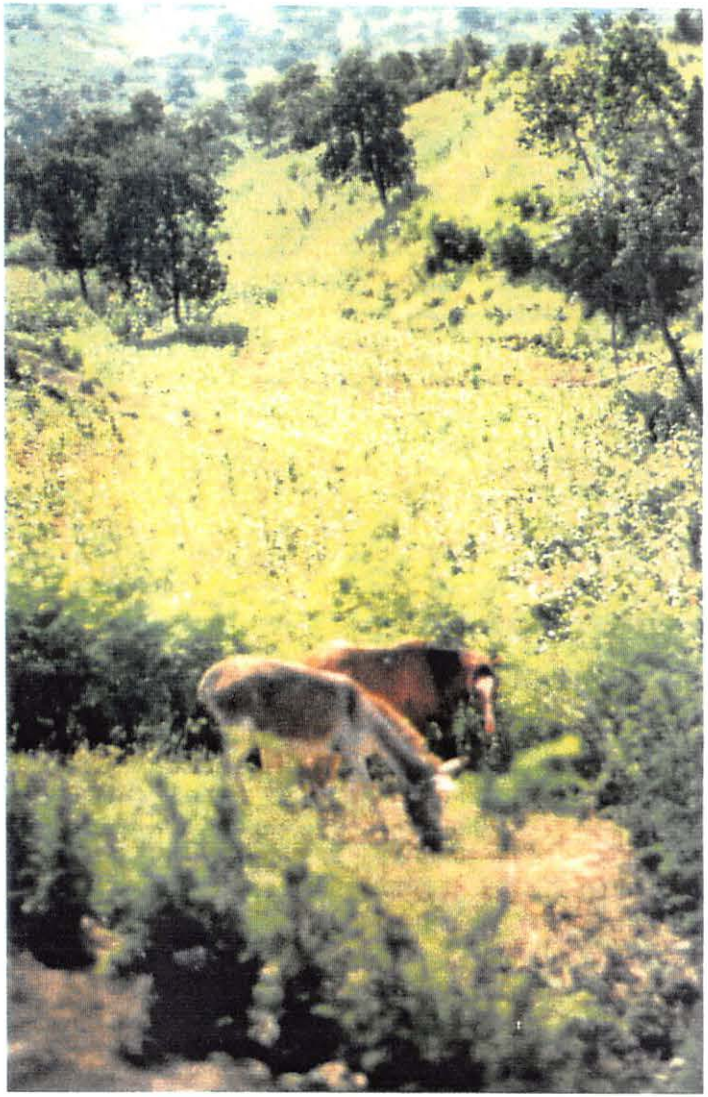
3A: Jacob. June. In foreground, several young Latanier palm trees - here used as shade for pigs. Household seen in background.



3B: Jacob. Leucaena hedgerows divide a field of corn. Latanier palm trees seen on sky line, behind homestead.

3C: Jacob: Most homes in this region are thatched with latanier palm fronds, also used for creating baskets, chair seats, carrying containers. Latanier palms are purposely cultivated in many fields.

4A: Jacob. June. Leucaena hedgerows in this field are directly grazed by household animals, creating bare strips of land between rows, prone to erosion.



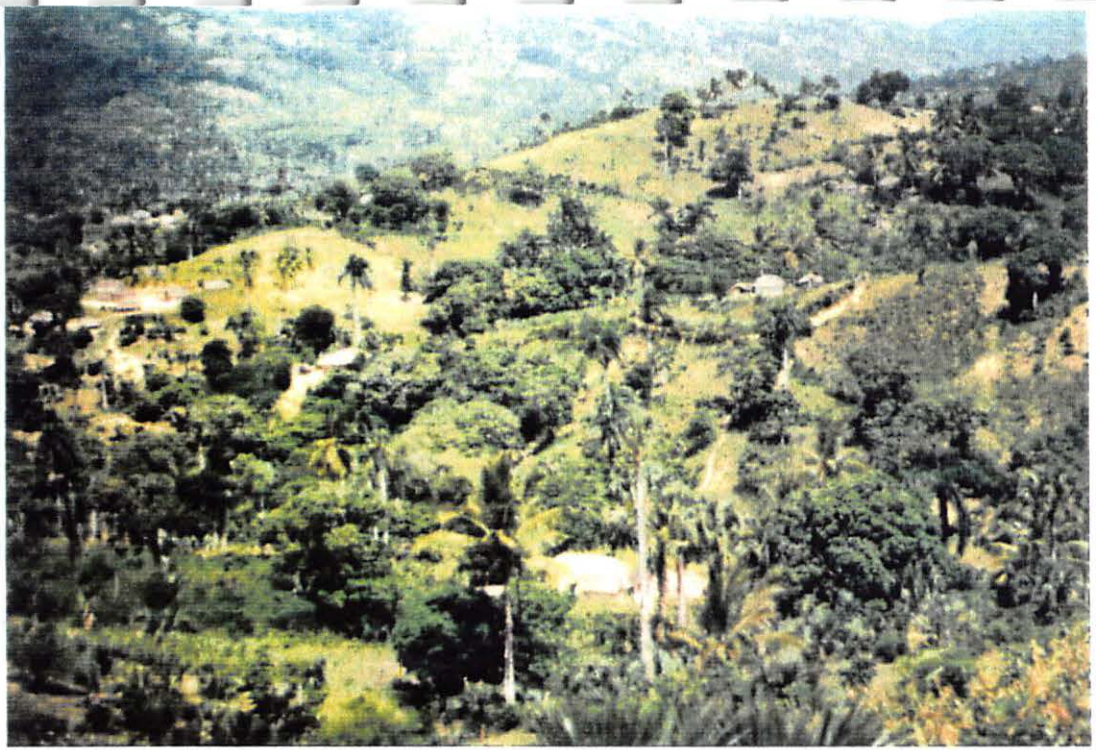
4B: Lafond. Leucaena hedgerows in this field have been overgrazed to the extent that they are being destroyed.

4C: Jacob: Horse and donkey were staked out between leucaena hedgerows for grazing. If farmer didn't use his hedgerows for this purpose, a neighbor or relative would have - as many of these fields are not owned by farmer.

5A: Lafond. June. Field of corn, manioc, sorghum, with rock terraces. Note earlier planted sorghum has been tied up to prevent shading of recently planted corn - a commonly observed technique.

5B. Lafond. Sheep were most common form of livestock observed in region and are staked out during this time of year to keep them out of the fields.

5C: Lafond. Many fields were observed to have cultivated clumps of grass (guinea) scattered over their surface - sometimes also tied together to prevent shading of younger cultivated plants.



6A: Jacob. June. General view of countryside. Note latanier palms. Homesteads are scattered across the hillsides.

6B. Passe Catabois. This relatively dry region encourages farmers to concentrate agricultural production in lower areas between hills - with residences frequently located along ridges of hills.

6C. Barbe Pagnole. Rock terraces are creating sometimes dramatic new strips of deeper and fertile soils across many fields - permitting increased corn production and appropriate sites for plantain, papaya.

Haiti Productive Land Use Systems Project

South-East Consortium for International Development

and

Auburn University

SECID/Auburn PLUS Reports

Report
No.

1. *Status of Seed Orchards and Tree Improvement Trials in Haiti and Plan of Activities 1993-1994.* by Joel C. Timyan. 1993. 72 pp.

2. *A Review of PDAI and ADS II Project Technologies.* by Marianito R. Villanueva. 1993. 31 pp.

3. *Monitoring and Evaluation System for PLUS.* by Angelos Pagoulatos. 1993. 53 pp.

4. *Rapport sur les Recherches d'Opportunités de Commercialisation pour les Produits Agricoles dans les Aires d'Intervention du Projet PLUS.* by Henry Jude Bélizaire and John Dale (Zach) Lea. 1993. 61 pp

5. *Guide to the Literature and Organizations involved in Agribusiness Research and Agribusiness Development in Haiti.* by Henry Jude Bélizaire and John Dale (Zach) Lea. 1993. 46 pp.

6. *Evaluation of Tree Species Adaptation for Alley Cropping in Four Environments in Haiti. A. Establishment Phase.* by Dennis A. Shannon and Lionel Isaac. 1993. 90 pp.

7. *Farmer Needs Assessment Exploratory Surveys: Executive Summary and Recommendations.* by Richard A. Swanson, William Gustave, Yves Jean and Roosevelt Saint-Dic. 1993. 53 pp.

8. *Farmer Needs Assessment Exploratory Surveys: Field Information Acquisition Guide and Methodology.* by Richard A. Swanson. 1993. 28 pp.

9. *Farmer Needs Assessment Exploratory Surveys: PADF Cap Haitian Region 3.* by Richard A. Swanson, William Gustave, Yves Jean and Georges Condé. 1993. 75 pp.

10. *Farmer Needs Assessment Exploratory Surveys: CARE Northwest Regions 2, 3 & 4.* by Richard A. Swanson, William Gustave, Yves Jean and Roosevelt Saint-Dic. 1993. 76 pp.

11. *Farmer Needs Assessment Exploratory Surveys: PADF Jacmel Region 2.* by Richard A. Swanson, William Gustave, Yves Jean and Roosevelt Saint-Dic. 1993. 84 pp.

12. *Farmer Needs Assessment Exploratory Surveys: PADF Mirebalais Region 3.* by Richard A. Swanson, William Gustave, Yves Jean and Roosevelt Saint-Dic. 1993. 91 pp.

13. *Farmer Needs Assessment Exploratory Surveys: PADF Les Cayes Region 1.* by Richard A. Swanson, William Gustave, Yves Jean and Roosevelt Saint-Dic. 1993. 84 pp.

14. *Food Marketing in Northwest Haiti: CARE Regions I-IV.* by Curtis M. Jolly and Melta Jean-Louis. 1993.

PLUS Special Report

Intervention Success Stories: Productive Land Use Systems Project. by J.D. (Zach) Lea, Roosevelt Saint-Dic and Frank Brockman. 1993. 39 pp.

SECID/Auburn Agroforestry Reports

Report
No.

1. *Tree Planting in Haiti: A Socio-Economic Appraisal.* By Donald R. Street. 1989. 48 pp.

2. *An Interim Report on Influences of Inoculation with Nitrogen-Fixing Symbionts on Reforestation Efforts in Haiti.* by R. Kent Reid. 1989. 13 pp.

3. *Short-Term Seedling Field Survival and Growth as Influenced by Container Types and Potting Mix.* By R. Kent Reid. 1989. 46 pp.

4. *Seedling Growth and Development in Different Container Types and Potting Mixes.* By R. Kent Reid. 1989. 15 pp.

5. *Microsymbiont Colonization and Seedling Development as Influenced by Inoculation Method: Rhizobium and Frankia.* by R. Kent Reid. 1989. 15 pp.

6. *The Charcoal Market in Haiti: Northwest to Port-au-Prince.* by Donald R. Street. 1989. 26 pp.

7. *Haiti Regional Tree Nursery Cost Study.* by R. Kent Reid and Donald R. Street. 1989. 19 pp.

8. *The Pole Market in Haiti: Southwest to Port-au-Prince.* by Donald R. Street and Philippe A. Bellerive. 1989. 21 pp.

9. *Socio-Cultural Factors in Haitian Agroforestry: Research Results from Four Regions.* by Paul D. Starr. 1989. 61 pp.

10. *Impact des Haies Vives sur la Production Agricole.* by Pierre M. Rosseau, Gene A. Hunter and Marie-Paule Enilorac. 1989. 14 pp.

11. *Outline of Techniques for Use in Studying Agroforestry Hedgerows and Alley Cropping Systems in Haiti.* by A.G. Hunter, Pierre M. Rosseau and Marie-Paule Enilorac.

12. *Pathology of Nursery Seedlings in Haiti: Diseases, their Etiology and Control.* by G.B. Runion, R. Kent Reid and Walt D. Kelley. 1990. 29 pp.

13. *Technical Constraints in Haitian Agroforestry: Research on Tool Use and Need in Two Regions.* by Paul D. Starr. 1989. 51 pp.

14. *Financial Analysis of Selected Tree Operations in Haiti's Northwest and Central Plateau.* by Donald R. Street, Arthur Gene Hunter and Philippe A. Bellerive. 1990. 36 pp.

15. *An Explorative Approach for assessing Soil Movement in Hillsides: Applications for Hedgerow Performance.* by Marie-Paule Enilorac, Pierre M. Rosseau and Arthur G. Hunter. 1990. 20 pp.

16. *Soil Profile Description for Selected Sites in Haiti.* by Richard L. Guthrie, Pierre M. Rosseau, Gene A. Hunter and Marie-Paule Enilorac. 1990. 72 pp.

17.[1] *Assessment of Hedgerow Performances in the Haitian Context.* by Pierre M. Rosseau, Arthur G. Hunter and Marie-Paule Enilorac. 1990. 41 pp.

18.[1] *Results of a Survey of Farmers in Selected CARE and PADF Intervention Areas.* By Marie-Paule Enilorac and Pierre M. Rosseau. 1990.

19. *Biological, Physical and Environmental Factors Affecting the Health of Trees Important to Haiti.* by G. Brett Runion and Walter D. Kelley. 1990. 101 pp.

---

[1]Limited distribution only.

20. *Storage Conditions and Pre-Germination Methods for Seed of Selected Tropical Tree Species*. by Joel C. Timyan. 1990. 23 pp.

21. *Factors Affecting Seedling Mortality in Haitian Agroforestry*. by Harry Elver. 1990. 36 pp.

22. *Agroforestry Research in Haiti: An Overview*. by Paul D. Starr, Donald R. Street, R. Kent Reid and Fritz Vaval. Contains 4 papers: The Social Foundations on Haiti Agroforestry; The Economics of Haiti Agroforestry; Forest Tree Nurseries in Haiti; and The Genetic Conservation of Native Tree Species. 1990.

23. *A Geographical Information System (GIS) Approach to Locating Potential Planting Sites for Catalpa longissima Species (Chêne) in Haiti*. by Fritz Vaval and Douglas C. Brown. 1990. 37 pp.

24. *Effects of Seed Treatment Methods on Germination of Simarouba glauca var. Latifolia Cronq*. by Fritz Vaval and Joel C. Timyan. 1990.

25. *Time Rate of Discounting and Decisions of Haitian Tree Planters*. by Donald R. Street. 1990. 17 pp.

26. *First-Year Seedlong Field Survival and Growth as Influenced by Planting Stock Type*. by R. Kent Reid. 1991. 65 pp.

27. *A Financial Analysis of Selected Hedgerow Operations in Haiti's Southern and Northwestern Regions*. by Philippe Bellerive. 1991. 31 pp.

28. *Alternative Techniques for Propagating Planting Stock: II. Small Plastic Bags*. by R. Kent Reid. 1991. 15 pp.

29. *Agroforestry Knowledge, Attitudes and Practices in Northwest Haiti*. by Paul D. Starr, Sigrid d'Aquin and Kathleen L. Rorison. 1991. 75 pp.

30. *The Effects of Alley Cropping and Fertilizer Application on Continuously-Cropped Maize*. by Dennis A. Shannon, Wolfgang O. Vogel and Kapinga N. Kabaluapa. 1991. 24 pp.

31. *Development of Stock Quality Criteria*. by R. Kent Reid. 1991. 30 pp.

33.[1] *Economic Indicators of Agroforestry II Strategy Implementation: Farm Income Analysis to Agricultural Project Analysis*. by Kent D. Flemming and G. Edward Karch. 1991.

Reports may be obtained by contacting the SECID/Auburn Office in Haiti or by contacting:

SECID
1511 K Street N.W., Suite 319
Washington, D.C. 30005-1403

Telephone: 202-628-4551 E-mail: SECID@aol.com
Facsimile: 202-628-4561 Telex: 215043 SECID CPEL