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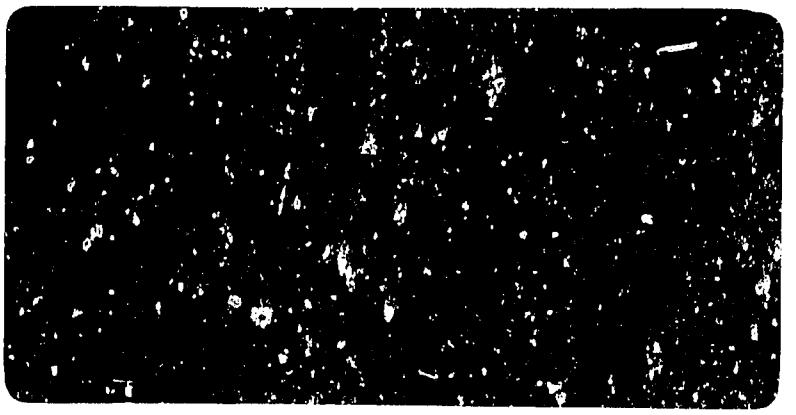

AGRICULTURAL DEVELOPMENT SUPPORT II
HAITI

University of Arkansas,
Fayetteville

RESULTS OF RURAL HOUSEHOLD SURVEY
IN BAS CAP ROUGE
AND
HAUT CAP ROUGE, JACMEL

Report #58

PN-ABC-244

AGRICULTURAL DEVELOPMENT SUPPORT PROJECT II

USAID CONTRACT #521-0092
between
The University of Arkansas, Fayetteville/Winrock International
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CAROLINE A. O'REILLY

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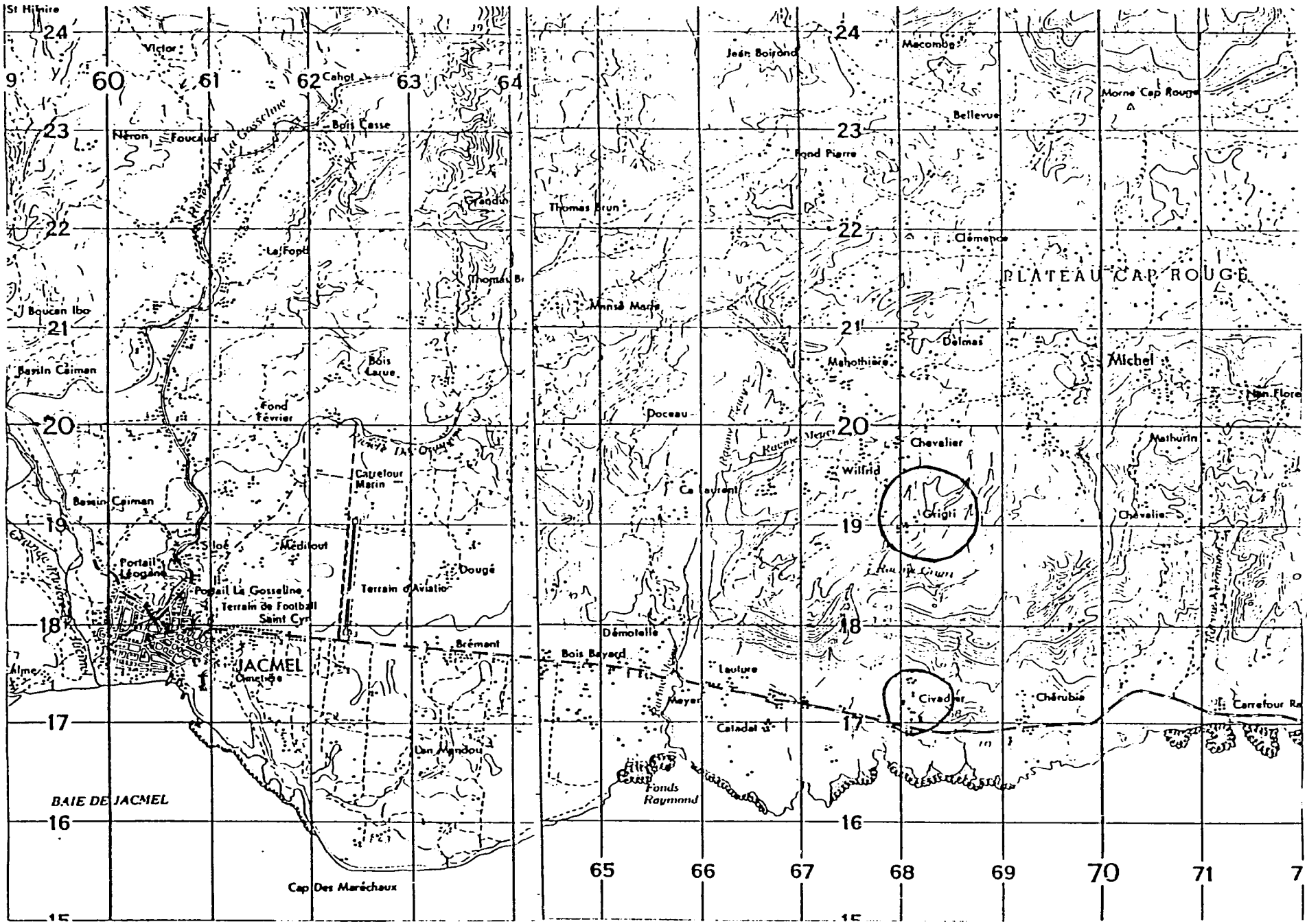
Figure 1: Location of the zones of Bas Cap Rouge (Cyvadier) and Haut Cap Rouge (Christ/Morija)



RESULTS OF RURAL HOUSEHOLD SURVEY IN BAS CAP ROUGE AND HAUT CAP ROUGE, JACMEL

1. Introduction

The results contained in this document represent a partial analysis of data collected in a household socio-economic survey (Suivi du Systeme de production) conducted between October 1986 and October 1987 in the Jacmel site of the ADSII project.

In the course of 3 years of operation up to this time, the project personnel had already accumulated a large amount of knowledge of the functioning of the farming system, through surveys, the agronomic trials programme and a range of other development activities. The aim of the Enquete du Suivi was to supplement this information base, providing further details on the agricultural system , with emphasis on labour use patterns, along with information on cropping patterns, use of inputs and agricultural outputs. The scope of the survey was deliberately restricted to a fairly narrow field of inquiry. It was felt that an over-ambitious attempt to examine all aspects of the household economy would lead to problems in both data-collection and analysis. However, it is recognized that the results presented herewith represent only a component of a more complex whole, encompassing a wide range of other activities and influences.

2. Methodology

2.1 Selection of households

A census undertaken in the two main areas of project intervention in Christ/Morija (Haut Cap Rouge) and Cyvadier (Bas Cap Rouge) in September 1986 provided an initial frame for the selection of households for participation in the survey. Forty households in each of the two zones were then chosen for a more detailed survey, on the basis of which the final selection of thirteen households per zone was made. Households were selected to represent a range of criteria: age of household head, land area and tenure, labour availability, etc. and also restricted to those able and willing to participate. (Two households, one in each zone, were subsequently eliminated from the survey).

2.2 Questionnaire design

A questionnaire was designed to record information on a daily basis. Page 1 consisted of data on labour utilization for each plot of land under cultivation and the use of inputs. Page 2 recorded data on harvested quantities and their disposal, and on livestock and livestock products. Minor modifications were made to the original questionnaire in early 1987, and the revised version was used for the remainder of the period (see Appendix 1).

2.3 Survey implementation

The survey commenced in late October 1986 in Haut Cap Rouge and late November 1986 in Bas Cap Rouge. Interviewing was primarily the responsibility of the two project enumerators, who had already been working in the two zones and were therefore

familiar to the respondents and well-acquainted with local conditions. The agricultural economist and certain agronomists also participated in some interviewing. A regular timetable of visits was fixed, each household to be visited once a week on a specific day, in order to minimize inconvenience for the respondents. Training and supervision were undertaken by the agricultural economists, who made regular field visits and checked returned questionnaires for completeness and consistency.

In the course of the first few months of the survey, all respondent households were given a young pig, within the ADSII pig distribution programme, in partial recompense for the time they gave up to speak with the enumerators. Some respondents voluntarily kept a notebook in which they recorded their activities day-to-day.

During the first agricultural season of 1987, enumerators, agronomists and monitors participated in an exercise to visit and measure all plots owned or operated by respondents. There being some 130 plots and 190 plots in Bas and Haut Cap Rouge respectively, this represented a very time-consuming task, which unfortunately was not completed, but a large number of plots were indeed measured. This served to verify and supplement information given by respondents on plot areas and crops under cultivation.

2.4 Data processing

Questionnaires were regularly collected from enumerators and brought to the project office in Jacmel for data entry. This was at first accomplished by the agricultural economist and later by a member of staff employed for that purpose. Data was entered and analysed on Statpac and graphs produced on Lotus 1-2-3.

2.5 Time-period of the survey and households included in the analysis

It had been hoped to conduct the survey over a complete agricultural year comprising the two major planting seasons of February/March/April and August/September, with their associated harvests. However, due to the political situation, fieldwork was prematurely terminated in mid-November. We nevertheless attempted to constitute data for a calendar year period. Thus, for all households in Haut Cap Rouge, data for the months of November and December relate to 1986, and the remainder to 1987. In Bas Cap Rouge, December data are again taken from 1986, whilst November represents a combination of 1986 and 1987 figures. However, it was still not possible to constitute an entire month's data for November for the majority of BCR households, and figures presented therefore underestimate total values for this month in most cases. Full details of the time-period of the data for each household are given in Appendix 2.

In addition, time constraints at the data-analysis stage have led to the exclusion of half of the households from the majority of analyses. In Haut Cap Rouge, the first six numbered households (HCR 1-6) were arbitrarily selected. In Bas Cap Rouge, those households with the most complete data sets were included (BCR 5,6,8,9,12,and 13). Although it is to be regretted

that complete analysis was not feasible, it is thought that the most important characteristics are illustrated by the twelve households analysed.

3. Characteristics of survey households

3.1 Location of households

Twelve households were located in each of the zones of Bas Cap Rouge (BCR) and Haut Cap Rouge (HCR). Within the plain area of BCR, most households were concentrated in the area of Cyvadier, some 10 km from the city of Jacmel. All households were within 200m of the main road to Jacmel, along which there is frequent public transportation. Water for irrigation is available from two springs. The main markets are at Jacmel and at Cayes-Jacmel, a further 15 km along the coast.

Households in HCR were mostly in the Morija/Christ area (altitude 600m). This is part of a series of sub-watersheds with steep and rocky slopes. The road to Jacmel (around 12 km away) is in poor repair, and public transportation infrequent. The main local market is at Canyette, some 3 km from Morija. The distance of households from the main road varied from around 0.5 to 200 km, but there are also paths descending to the plain for those travelling by foot.

3.2 Demographic and occupational characteristics

Basic characteristics of the households were recorded before the weekly visits commenced. The most important characteristics are given in Table 1. Average age of the head of household was approximately the same in both zones, at 47 years and 48 years for Bas and Haut Cap Rouge respectively, and in all but one cases was male. Average number of household members was greater in Bas Cap Rouge by 0.66, at 6.58, and with a higher average age. The ratio of 15+ year-olds to total residents was 63% in BCR and 49% in HCR, suggesting a higher availability of agricultural labour in BCR. However, when the occupation of household members is examined, it emerges that there is little difference in the number of persons engaged in agriculture as their principal activity--on average 2.2 per household in BCR and 2.4 in HCR. The wives of household heads in both zones were often responsible for the marketing of farm (and other) produce, and sometimes a household member was involved in an artisanal activity. There was a higher number of children at school in BCR (2.4 per household on average compared to 1.3 in HCR), due to their higher average age. They also tended to participate more in agriculture as a secondary activity.

3.3 Land and livestock resources

Farm size was on average greater in Bas Cap Rouge, although when the largest farm of 8.24 carreaux is excluded, the average size of the remainder is 1.72 carreaux (or 2.22 ha). This is slightly lower than the average in Haut Cap Rouge of 1.87 carreaux (or 2.41 ha). The distribution of farm size for the two zones is given in Table 2 below. Farms tended to be more fragmented in the mountain zone of HCR, with more gardens and plots per holding, and a correspondingly lower average plot size

TABLE 1

CHARACTERISTICS OF SURVEY HOUSEHOLDS

H/hold #	Head of h/h Sex	Age	# household members >15 yrs	<15 yrs	Total	Agriculture main occ.	Land Inventory Gardens	Plots	Area(Cx)	Avg. area per plot	Land tenure Property	Share-crop	Rent	Indivision	Livestock Inventory Poultry	Cattle	Goats	Pigs
BCR1	M	62	5	1	6	4	12	20	8.240	0.41	8.240	0	0	0	14	9		
BCR2	M	42	3	3	6	1	7	13	2.040	0.16	1.540	0.500	0	0	5	3	11	1
* BCR3	M	32	3	5	8	2	7	8	1.760	0.22	0.660	0	0.150	0.950	8	3	2	2
BCR4	M	42	5	4	9		4	6	0.680						29	0	0	1
* BCR5	M	39	2	4	6	1	7	10	0.715	0.07	0.040	0.675	0	0	1	1	4	1
* BCR6	M	51	5	3	8		6	15	3.750						38	2	15	0
BCR7	M	51	6	0	6	1	5	9	1.250	0.14	1.000	0	0.250	0	40	3	1	1
* BCR8	M	43	4	3	7	2	9	10	3.145	0.31	2.640	0	0.180	0.325				
* BCR9	M	52	6	0	6	5	8	9	1.150	0.13	0	0.850	0.100	0.200				
BCR10	M	64	4	2	6	1	5	12	2.080	0.17	0.550	1.530	0	0				
* BCR12	M	54	5	2	7	4	6	9	1.795	0.20	0.935	0.660	0.200	0	24	2	4	11
* BCR13	M	30	2	2	4	1	4	5	0.560	0.11	0.250	0	0	0.310	7	3	0	1
Average		47	4.17	2.42	6.58	2.20	6.7	10.5	2.264	0.216	1.586	0.422	0.089	0.179	18.4	2.9	4.3	2.1
* HCR1	M	33	2	5	7	2	8	10	1.240	0.12	0.250	0	0.990	0	7	0	3	0
* HCR2	M	62	4	1	5	3	8	26	3.090	0.12	1.740	0	1.190	0.160	20	2	4	0
* HCR3	M	59	3	1	4	2	7	14	3.100	0.22	3.100	0	0	0	3	1	0	2
* HCR4	M	29	2	2	4	2	8	13	1.280	0.10	1.130	0	0.150	0	19	3	3	1
* HCR5	M	46	5	5	10	2	11	16	1.455	0.09	0.475	0.190	0.790	0	20	3	1	1
* HCR6	M	54	3	5	8	2	11	15	1.510	0.10	0.610	0.080	0.820	0	13	5	5	0
HCR7	M	36	2	4	6	2	7	17	2.025	0.12	1.030	0.220	0.375	0.400	13	2	0	0
HCR8	M	52	5	0	5	5	9	16	1.965	0.12	0.395	0.740	0.030	0.800	9	7	4	1
HCR9	M	36	2	5	7	2	6	14	0.760	0.05	0	0	0.245	0.515	13	2	0	1
HCR10	M	42	2	3	5	2	6	10	1.430	0.14	0.080	0.540	0.250	0.560	8	2	0	0
HCR11	F	49	2	1	3	2	8	15	1.370	0.09	0.580	0.690	0.100	0	17	0	0	0
HCR12	M	70	3	4	7	3	8	18	3.240	0.18	3.240	0	0	0	31	3	0	0
Average		48	2.92	3.00	5.92	2.42	8.1	15.3	1.872	0.122	1.053	0.205	0.412	0.203	14.4	2.5	1.7	0.5

Note: Blanks indicate data not available

* Household included in analysis (unless otherwise indicated)

(0.12cx compared to 0.22cx in BCR).

Table 2. Distribution of farm size

Farm size (carreaux)	Bas Cap Rouge	Haut Cap Rouge
<1	3	1
1-2	4	7
2-3	2	1
3-4	2	3
>4	1	0

With regards to land tenure, Figures 2 and 3 show that a higher proportion of land was privately-owned property in Bas Cap Rouge (excluding two BCR households for which data are not available). The two households with the biggest total land area (one in each zone) held 100% in property. Sharecropping was relatively more frequent in Bas Cap Rouge, and private rental in Haut Cap Rouge. Amongst sharecroppers, those in BCR tended to hold higher proportions of their total land area under this form of tenure than in HCR. Land was rented by all but two households in HCR, in areas ranging from 0.03 to 0.99cx per household. Renting was less common in BCR and when found was for only small areas up to 0.25cx. This suggests that the land market is relatively more flexible in Haut Cap Rouge than in the irrigated plain. Land under indivision (undivided inheritance) was slightly more common in Haut than Bas Cap Rouge.

All households kept at least one form of livestock (data are not available for 3 BCR households). Poultry was kept in numbers ranging from 1-40, with a slightly higher per household average in BCR. All households except three kept one or more cattle. These were owned in the majority (85%) of cases in Bas Cap Rouge, whereas in Haut Cap Rouge 60% were held in gardiennage i.e. being kept in return for a proportion of the offspring. Goats appeared to be relatively more common in Bas Cap Rouge, and again were owned; in HCR 30% were in gardiennage. It is likely that the pigs recorded were those young pigs donated by the project, but this is not entirely clear. One farmer in Bas Cap Rouge had already established a pig enterprise, with 2 sows, a boar, and 8 piglets. All pigs were owned.

4. Patterns of labour use

4.1 Treatment of labour data

Total farm labour utilization as recorded in the survey consists of two types -- household (or family--used loosely in the sense of all persons resident in the household) and non-household. Family labour was divided into four categories -- head of household, spouse, children less than 15 years and other household members. No weighting was applied in the analysis to adjust the contributions made by different labour categories. For households with a high proportion of total labour provided by the "children under 15 years" category this arguably leads to an

Figure 2

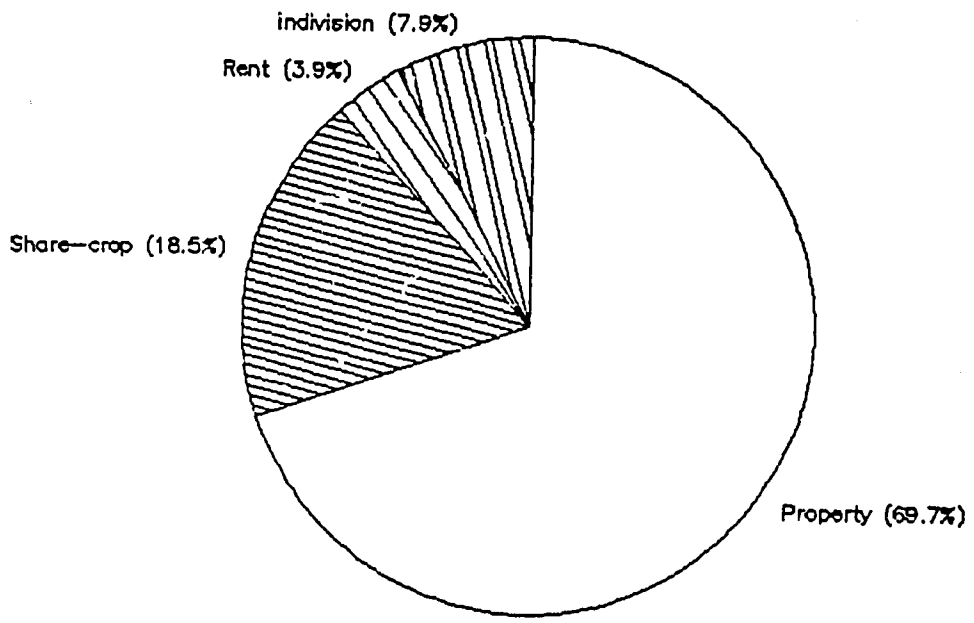
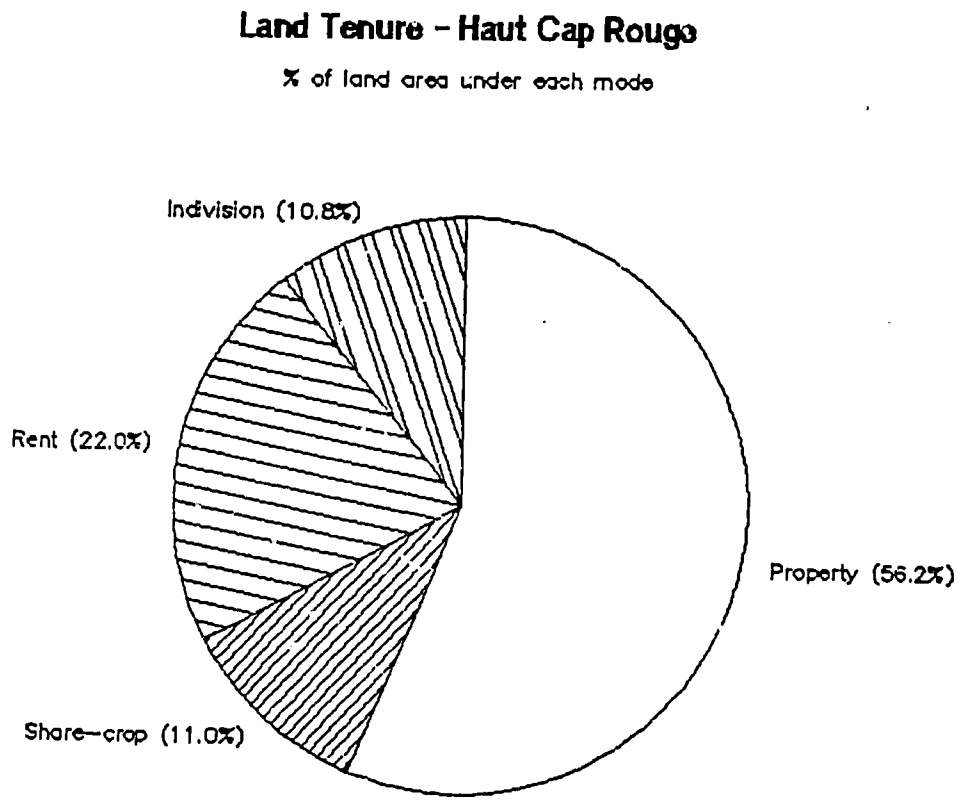


Figure 3



overestimation of total labour hours. This is in fact the case in only two households (BCR 8 and HCR 5) where this labour category accounted for 21% of total labour use in each case, and to a lesser extent in BCR 6 and HCR 6 (10% and 8.5% respectively). As a percentage of total labour use for the zone this represents 6% for BCR and 4% for HCR. Therefore, a downward adjustment of 3% and 2% might be made to total and average labour hours for Bas and Haut Cap Rouge respectively (assuming a 0.5 weighting to labour under 15 years). This was not thought to be a large enough modification to merit adjustment of the data prior to analysis.

Non-household labour was treated as a single category for the purpose of the analysis of labour inputs, regardless of whether it was paid in cash, in-kind, both or not at all. However, a separate analysis has been made of the relative importance of different forms of labour remuneration (see Section 4.6).

A household's total labour use patterns are a function of the interaction between the labour supply and the type of cropping system practised. The labour supply itself depends on a number of factors -- the number of household members of working age available for participation in agricultural activities, the household's involvement in traditional konbit (reciprocal working groups) as well as other factors such as land area, quality and tenure, rainfall and other physical constraints.

4.2 Family labour availability

Table 3 below gives average figures for the 6 households analyzed in each zone, to illustrate the relationship between land and labour availability.

Table 3 Land and family labour availability

	Bas Cap Rouge	Haut Cap Rouge
Ave. # persons/hh	6.3	6.3
Ave. # persons > 15 years	4.0	3.2
Ave. # persons with agriculture as main occupation	2.6*	2.2
Ave. land area/hh (cx)	1.853	1.946
Area/person (cx)	0.29	0.31
Area/person > 15 years (cx)	0.46	0.61
Ave. hours family labour/yr.	1623	1299
Hours of labour/cx.	876	668

* no data for BCR 6.

It can be seen that whilst the ratios of land to total number of household members are similar in the two zones, the younger age structure of HCR families leads to a lower land:adult labour ratio. This is reflected in lower overall family labour use in Haut Cap Rouge, by some 320 hours per household per year, and also in lower family labour inputs per unit area. There are nonetheless considerable inter-household differences in the ratio of land area to adult resident, ranging from 0.19 cx/adult (BCR

9) to 1.03 cx/adult (HCR 3).

4.3 Total on-farm labour use.

The family labour supply is supplemented to differing degrees by the use of non-family labour. Table 4 (overleaf) shows the contributions made by each labour type for each household. The lower input of family labour in Haut Cap Rouge is to a large extent compensated for by higher inputs of non-family labour, such that total labour use is only some 6% less on average that in Bas Cap Rouge. Total labour utilization can in all cases be seen to correspond closely with total land area (see Figure 4).

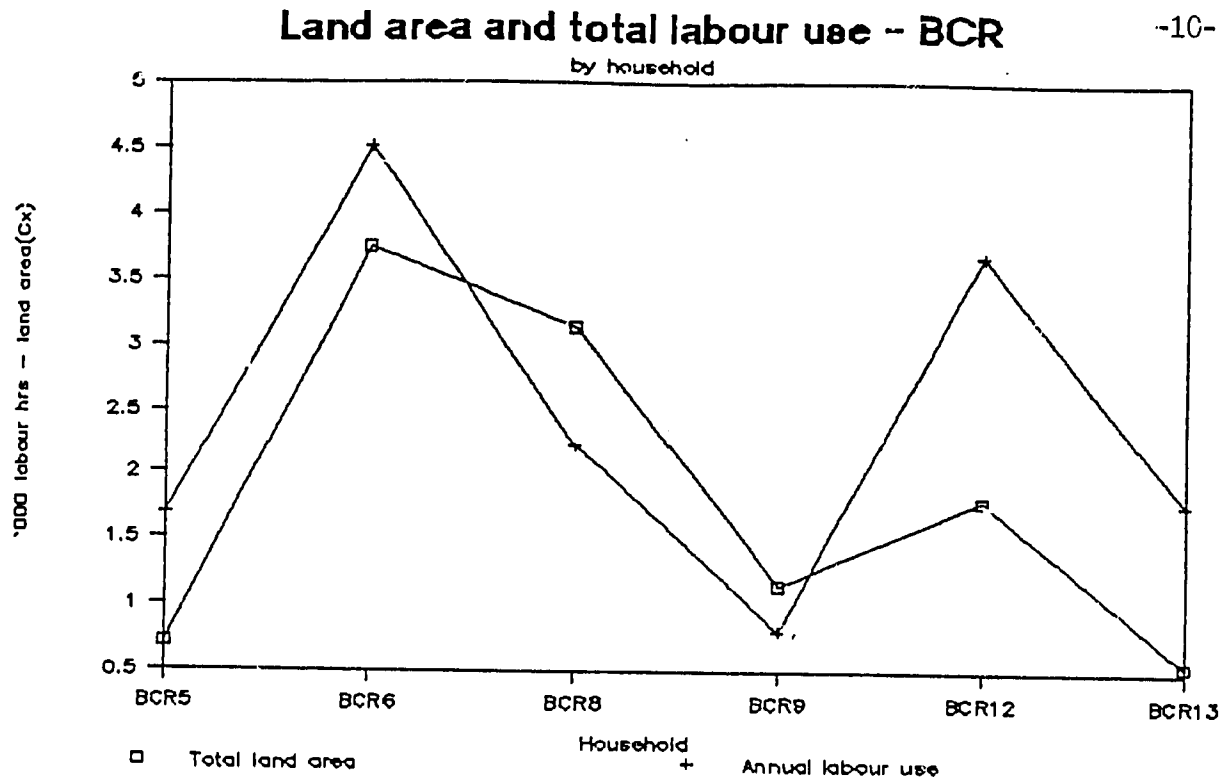
With regards to the relative proportions contributed by the different labour types, non-family labour was more important in Haut than in Bas Cap Rouge, on average representing 10% more of total labour use. Nonetheless, it is still significant in the majority of BCR households, contributing 25% or more in all but two cases (BCR 8 and BCR 9). The first is characterised by heavy use of children and other family labour, the second by low total labour use. In HCR, non-family labour in all cases accounted for 25% or more of total labour use.

Table 4 Total annual labour use per household (in hours)

Household #	Family	Non-family	Total	% family	% non-family
BCR 5	1234	462	1696	72.8	27.2
BCR 6	3338	1174	4512	74.0	26.0
BCR 8	2054	168	2222	92.4	7.6
BCR 9	680	131	811	83.8	16.2
BCR 12	1533	2151	3684	41.6	58.4
BCR 13	897	877	1774	50.6	49.4
BCR Average	1623	827	2450	66.2	33.8
HCR 1	960	842	1802	53.3	46.7
HCR 2	1951	2199	4150	47.0	53.0
HCR 3	1292	1461	2753	46.9	53.1
HCR 4	1008	709	1717	58.7	41.3
HCR 5	1499	489	1988	75.4	24.6
HCR 6	1081	350	1431	75.5	24.5
HCR Average	1299	1008	2307	56.3	43.7

These relationships are further illustrated in Figures 5-8, which show, for selected households, the proportion of total on-farm labour supplied by the different categories. The contrast is clear between BCR 5 and BCR 6 for example. The first is a small land-holding, operated mainly by the head of household who has young children and therefore limited supplies of family labour; the second is a large holding relying heavily on the contribution of the older children, plus considerable outside labour inputs. In all BCR households, the labour of the spouse represented around 5% or less of the total. In HCR, the spouse was a more important agricultural labour source (between 8% and 20% in four cases). Heavy reliance on non-family labour is illustrated by HCR 3, a small family of 4 persons. HCR 6 is a

Figure 4


Land area and total labour use - BCR
by household
'000 labour hrs - land area(Cx)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
BCR5
BCR6
BCR8
BCR9
BCR12
BCR13
Household
Total land area
Annual labour use

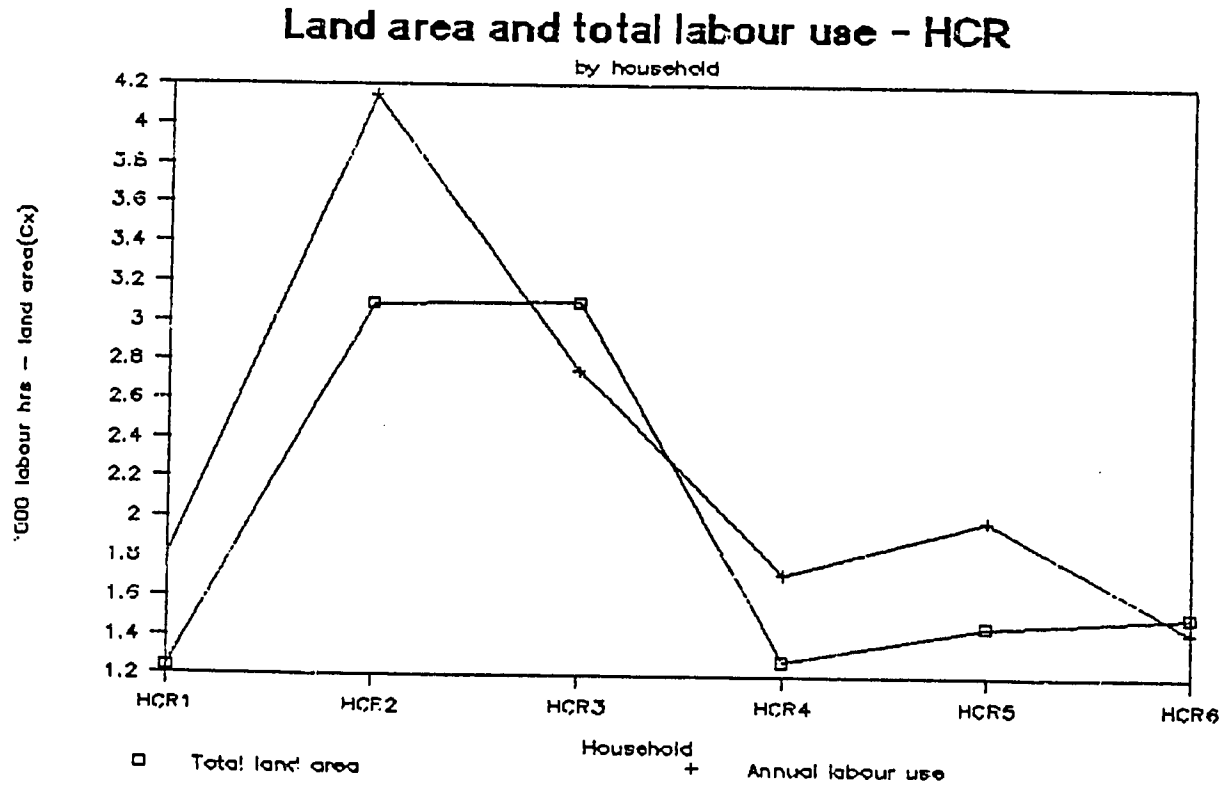

Land area and total labour use - HCR
by household
'000 labour hrs - land area(Cx)
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
HCR1
HCR2
HCR3
HCR4
HCR5
HCR6
Household
Total land area
Annual labour use

Figure 5

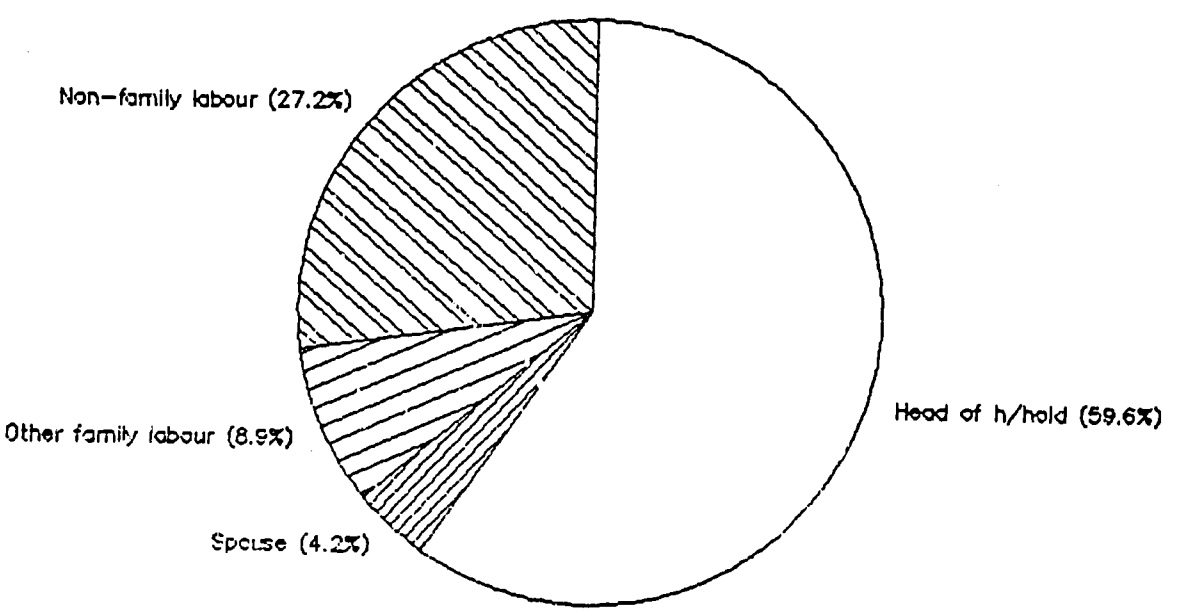


Figure 6

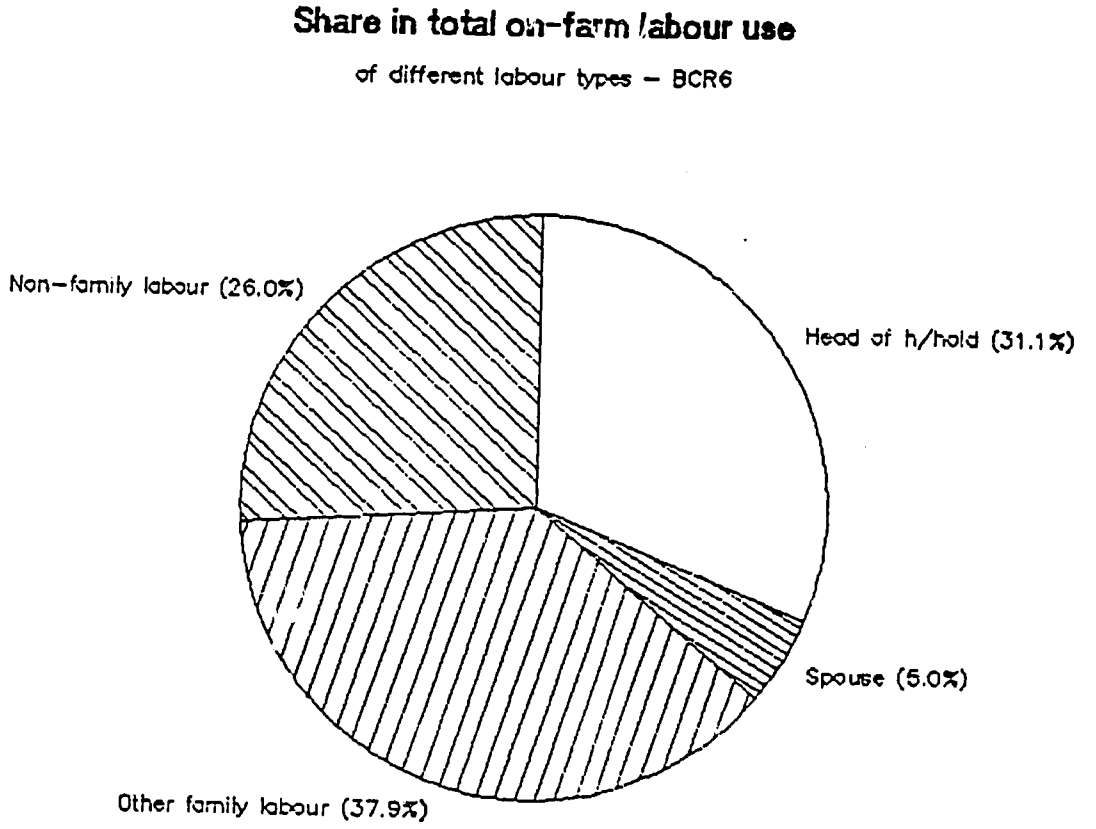


Figure 7

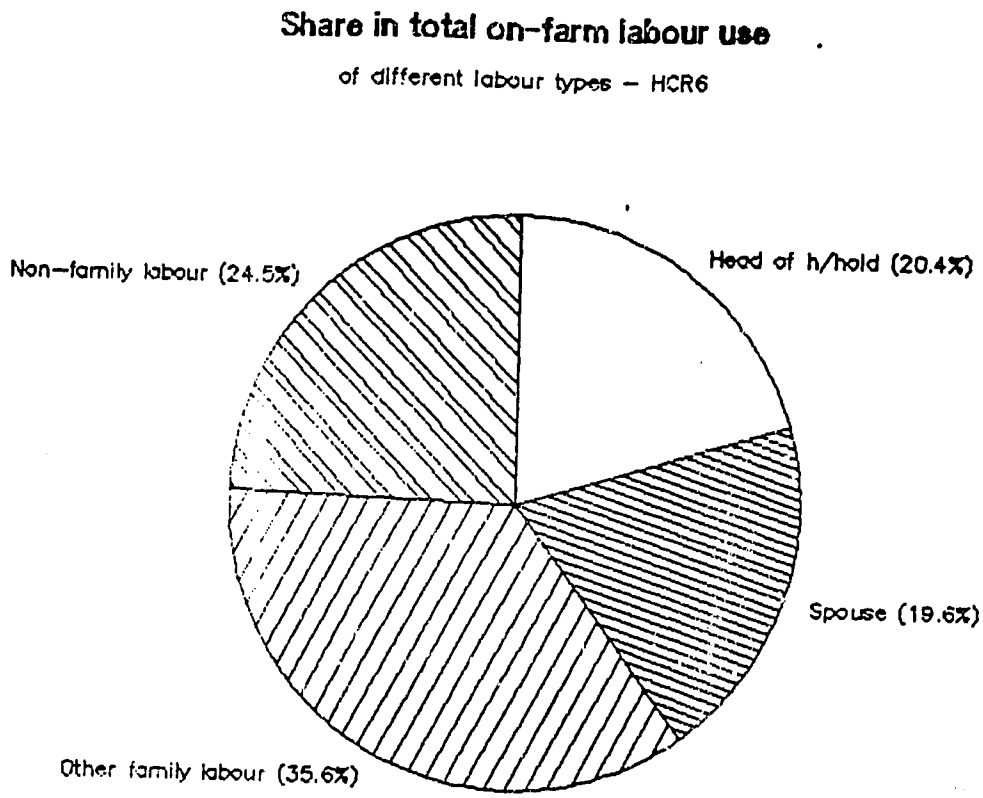
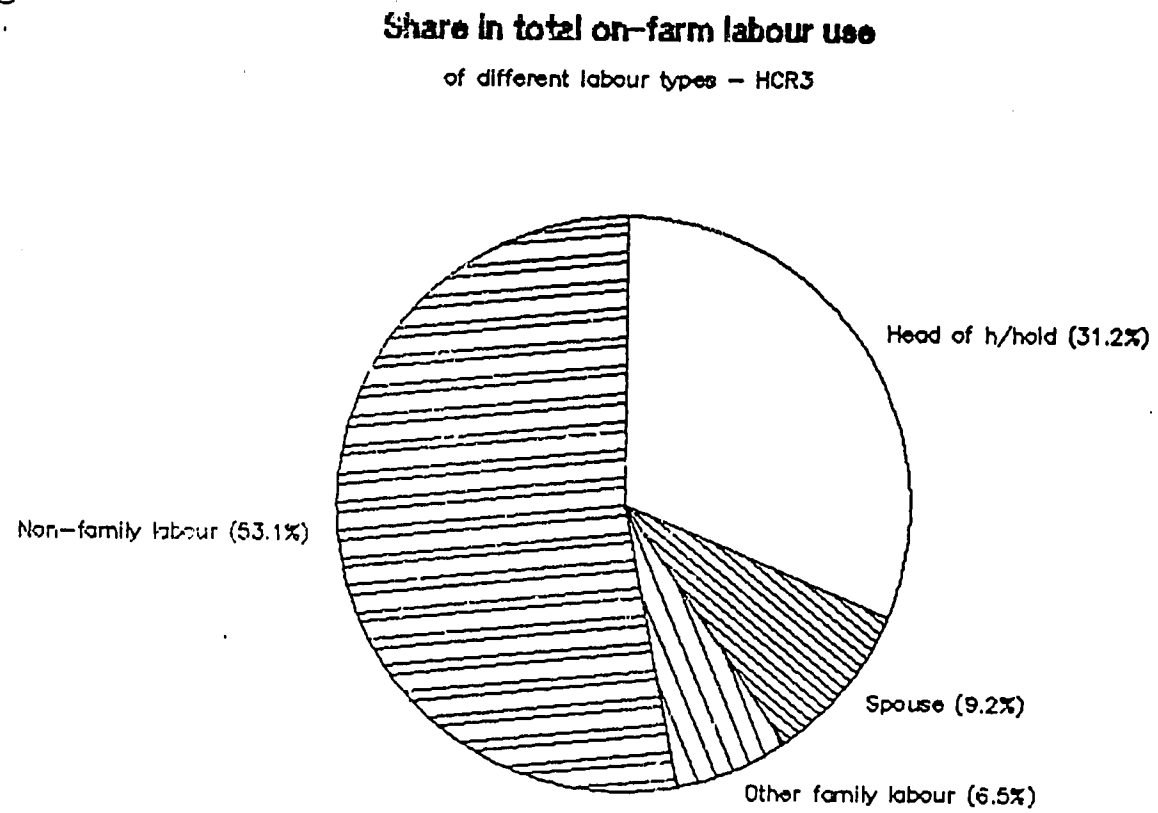


Figure 8



case of low total labour use, approximately equally divided between the different categories.

4.4 Type of labour by operation

Figures 9 and 10 show the average use of family and non-family labour for each of the main cultural activities. In both zones, it can be seen that non-family labour was most important in the most labour-demanding operation, land preparation, where it represented over 50% of total labour use. In HCR, non-family labour was also important for planting, again providing over 50% of total requirements. This activity was relatively more demanding of labour in HCR, whereas weeding and harvesting requirements were greater in BCR. In both zones, these latter activities were primarily undertaken by family labour. Harvesting used least total labour of all operations with a small participation by non-household members (12% and 11% in BCR and HCR respectively).

4.5 Composition and activities of non-family labour force.

Non-family labour variously took the form of individuals or pairs working alongside the household head or other family members, or larger groups of people ranging up to 30 or 35 persons in some cases. This depended on the type of operation being undertaken. Average group size was 2.8 in BCR and 2.9 in HCR. Groups also varied according to their composition by sex. The incidence of male and female non-family labour is given in Table 5.

Table 5 Participation of male and female non-family labour

Group Composition	Bas Cap Rouge		Haut Cap Rouge	
	# cases	%	# cases	%
Male only	381	93	357	83
Female only	20	5	32	7
Mixed	10	2	43	10

The "male only" group was by far the most common in both zones, with female labour being relatively more important in Haut than in Bas Cap Rouge. We can further look at the activities in which the different sexes were engaged. Figures 11-14 are based on the number of cases of the use of male/female labour, regardless of the number of hours actually worked. They therefore indicate the participation of males and females in different activities, but not the relative time allocated to each. In both zones, land preparation, planting and weeding together accounted for around 70% of "male only" activities. The "other activity" category in BCR comprised a considerable proportion of charcoal manufacture, practised by two households (BCR8 and BCR12). Certain operations in the cultivation of tomatoes are also included here. Dry wall construction in HCR was a major occupation of male non-family labour. Female labour participation was restricted solely to planting, weeding and harvesting. The "other activity" in BCR was the shelling of maize.

Figure 9

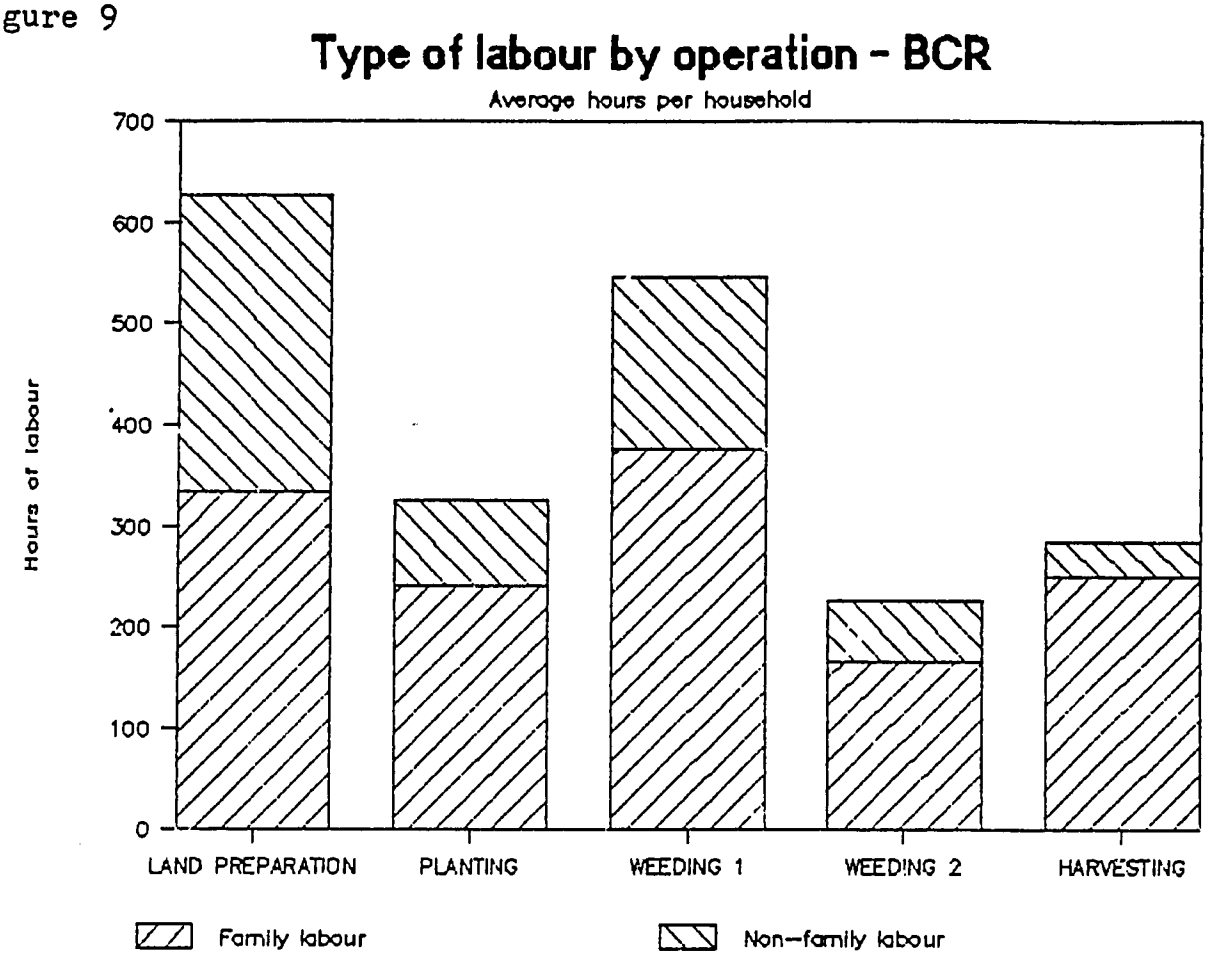


Figure 10

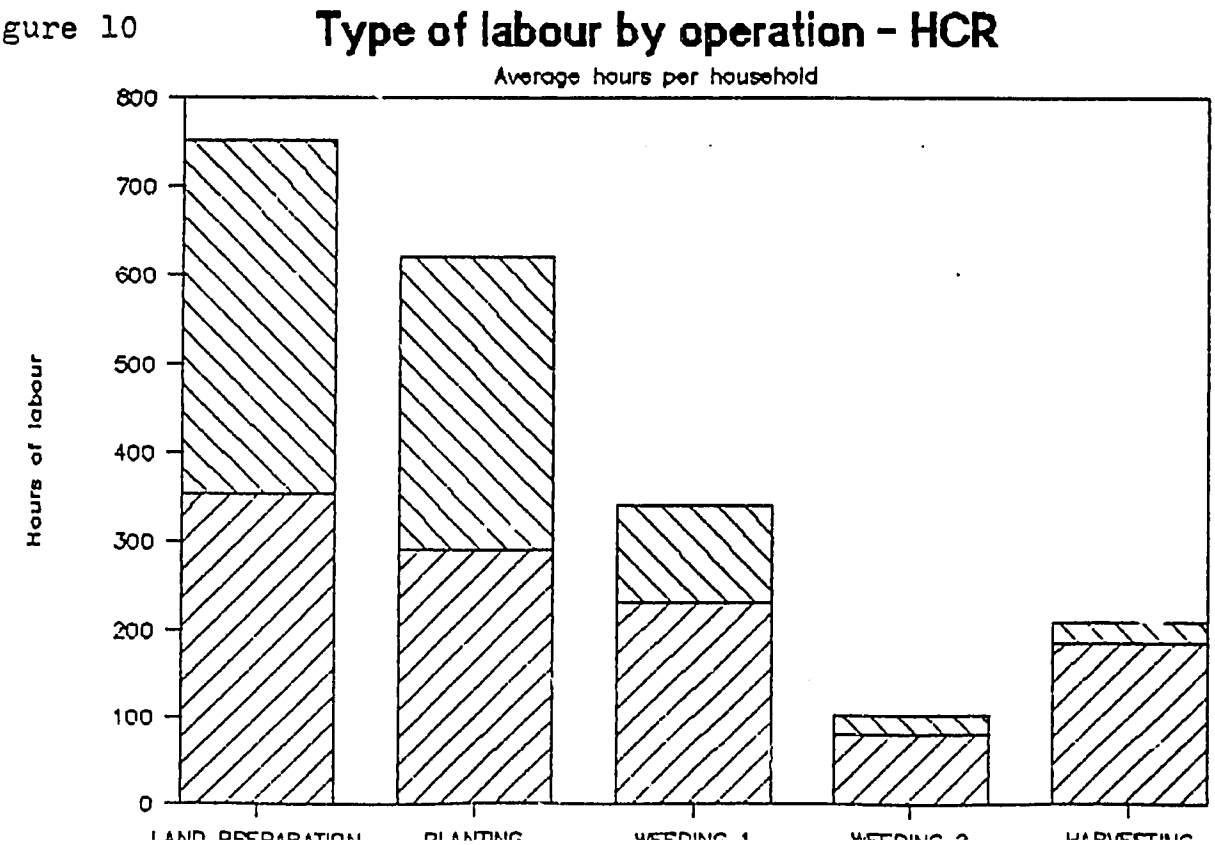


Figure 11

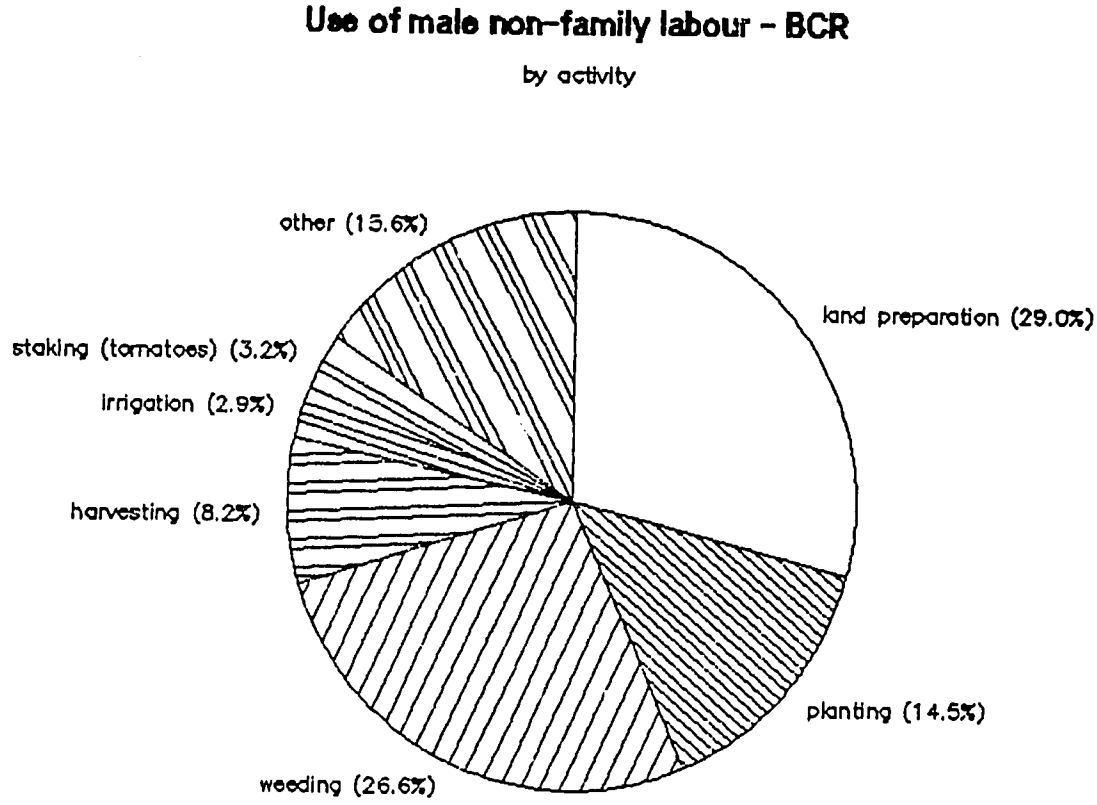


Figure 12

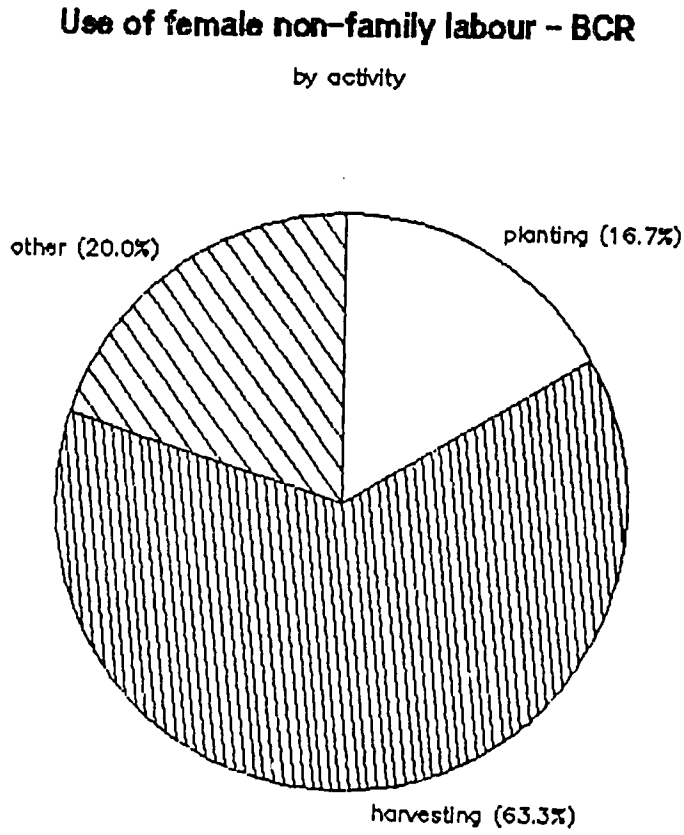


Figure 13

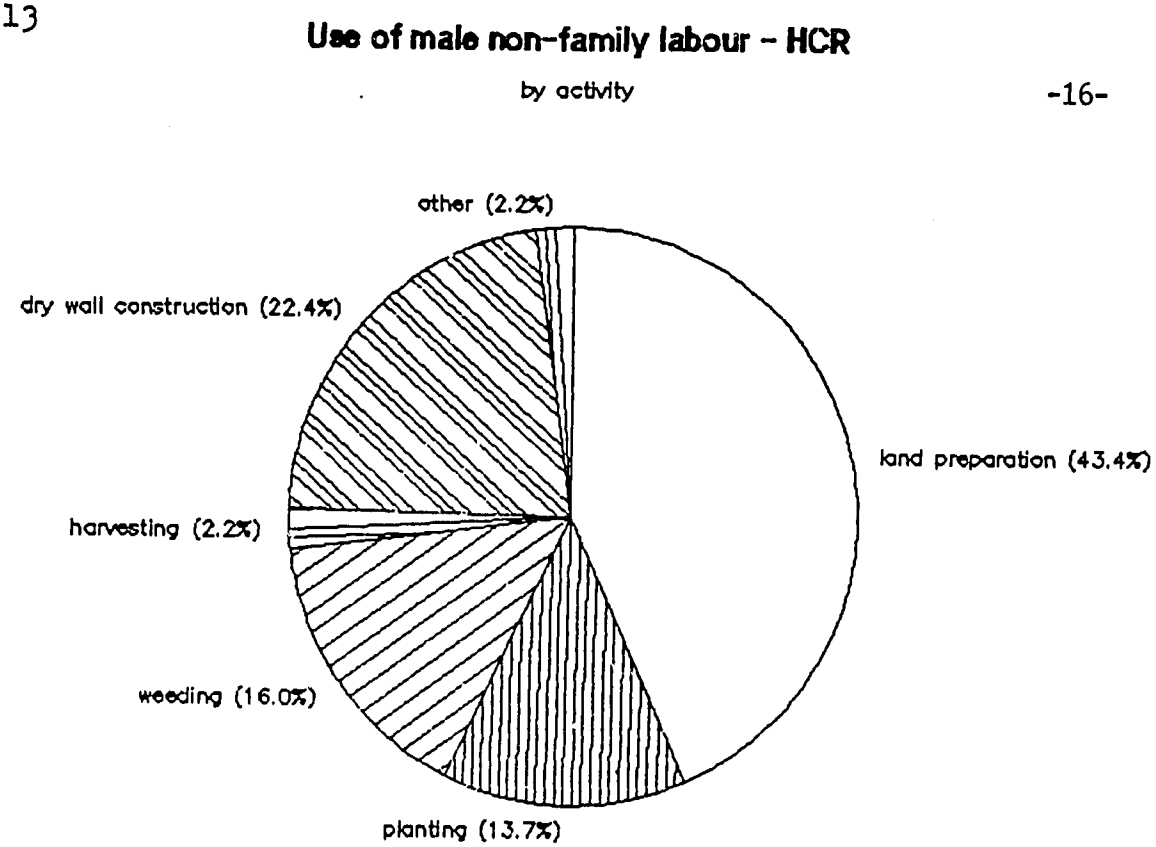
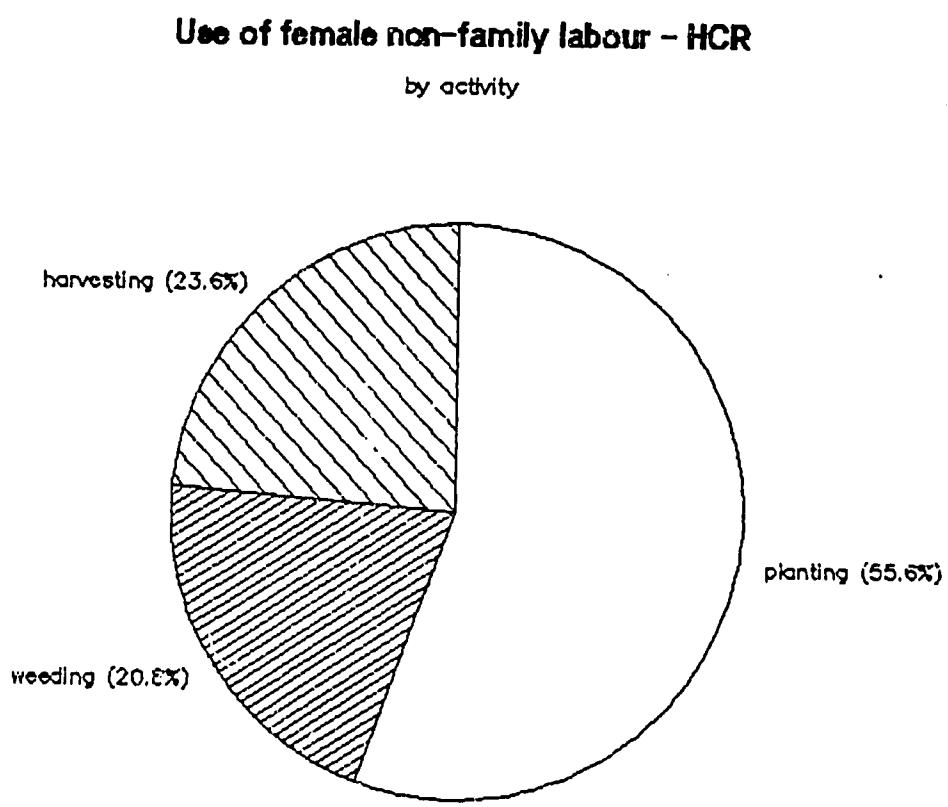


Figure 14



4.6 Remuneration of non-family labour

Non-family labour was remunerated in two ways - by a daily cash wage (usually at a rate of 5 gourdes - US$1.00 - per 6-8 hour day), and/or by a meal provided in the course of the day.

Table 6 shows the incidence of these two forms of payment.

Table 6 Forms of labour remuneration

	Bas Cap Rouge	Haut Cap Rouge
# cases non-family labour use	442	438
# cases paid cash	248	182
% cases paid cash	56%	42%
# cases paid in-kind	347	407
% cases paid in-kind	79%	93%

Payment in-kind was more common than cash payment in both zones, being almost universal in Haut Cap Rouge (between 88% and 96% for all households). Although on average less common in Bas Cap Rouge, 3 households in fact provided food in more than 90% of cases and 1 in 73% of cases. Cash as a means of payment was more widespread in BCR, 4 households paying cash in more than 50% of cases. The remaining two (BCR5 and BCR8, paying cash in 30% and 15% of cases respectively) also paid in-kind only 50% of the time. This low rate of remuneration perhaps suggests some special labour arrangement; this would require further invvesigation. Both are cases of low levels of non-family labour use, and small average group size (1.6 persons). In Haut Cap Rouge, cash payment was rare (less than 25% of instances) in all but two cases. These cases (HCR2 and HCR3) were the largest users of non-family labour, and paid in cash some 70% of the time.

The total cost of non-family labour over the calendar-year period averaged 970 gourdes ($194) per household in HCR and 1170 gourdes ($234) in BCR. The distribution is given below in Table 7.

Table 7 Annual cost of non-family labour

	# of households	
Gourdes	Bas Cap Rouge	Haut Cap Rouge
0 - 500	2	3
500 - 1000	1	1
1000 - 2000	2	1
2000 - 3000	0	1
3000 +	1	0

The "in-kind" component of this (estimated by the respondent) was on average higher in HCR, at 63% of total cost, compared to 55% in BCR. It varied from around 50% of the total (HCR 2 and 3, BCR 9,12 and 13) to a maximum of 95% and over (HCR 1, 4 and 6). On a per hour basis, the total cost of BCR labour

was higher at an average of 1.40 gourdes ($0.28) per hour, compared to 0.95 gourdes per hour ($0.19) in HCR. The BCR figure is biased upwards by the BCR 12 average of 1.70 gourdes/hr.; excluding this, the average for the remaining households is 1.20 gourdes/hr.($0.24).

4.7 Use of family labour on- and off-farm.

The use of reciprocal work groups as a source of labour implies the return of that labour on the holdings of other farmers. Data were collected on the hours of labour expended by family members outside the family holding, in agriculture-related activities. The results are presented in Figures 15 and 16. Off-farm labour was less important in Bas Cap Rouge, in five cases accounting for 6% or less of total labour use. In Haut Cap Rouge the proportion was above 10% in five cases out of the six. This is normal considering the greater use of non-family labour here. However, on a case-by-case basis, the households showing the highest proportions of family labour use off-farm are not necessarily those employing the largest quantities of non-family labour (cf Table 4). This can be explained by the use of non-reciprocal paid labour, particularly in the cases of BCR6, BCR12, HCR2 and HCR3.

Figures 17 and 18 show the correspondence in patterns of on- and off-farm labour use over the year. For these households engaging in off-farm labour, the peaks fall just prior to the start of the busy seasons of land preparation, during which household labour is fully employed on the family farm.

5. Cropping patterns and calendars

5.1 Rainfall and cropping seasons

Data collected over the project period suggests that rainfall is both more abundant and better distributed in the mountain than in the plain zone (cf Figure 19). Total rainfall for 1985 was 1563 mm in BCR (Cyvadier) and 1633 mm in HCR (Vergeon) and for 1986 was 1656 mm and 2000 mm for BCR (Cyvadier) and HCR (Christ) respectively. Complete data are not available for 1987. The distribution is bimodal in both zones, with a first peak in April-May and a second in September - October - November. The short dry season around June-July is more marked in the plain. According to farmers, the rains are expected earlier on the plateau.

This results in an earlier first cropping season in Haut Cap Rouge, where the dry season of December-February is also less marked. In addition temperatures are lower than in BCR due to the altitude. This season tends to be more extended in Haut than Bas Cap Rouge.

The second season (from August through December) is less certain in Bas Cap Rouge, where the rains come in the form of storms, and high temperatures lead to less favourable soil moisture conditions than on the plateau. However, much sought-after water for irrigation is available from two springs which emerge at the foot of the limestone plateau.

5.2 The labour profile and cropping calendar

Figure 15

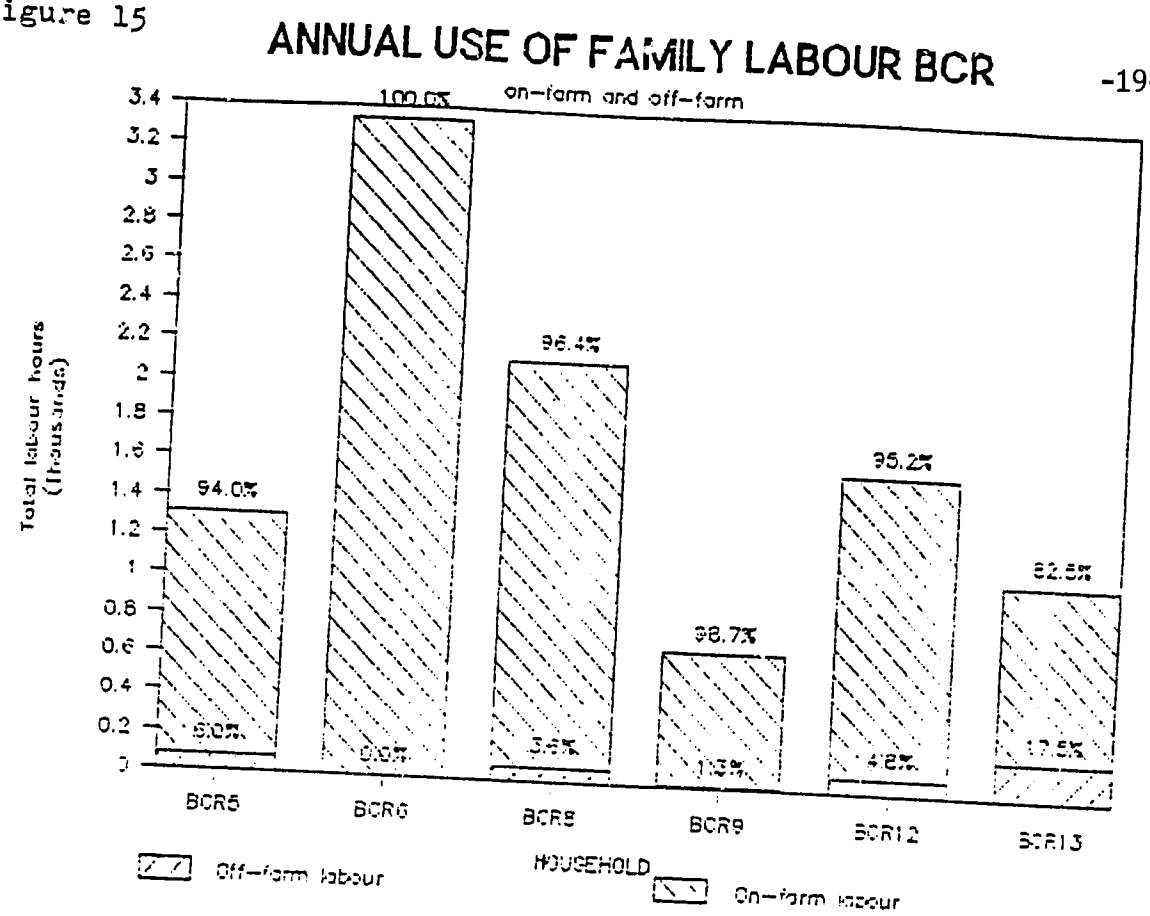


Figure 16

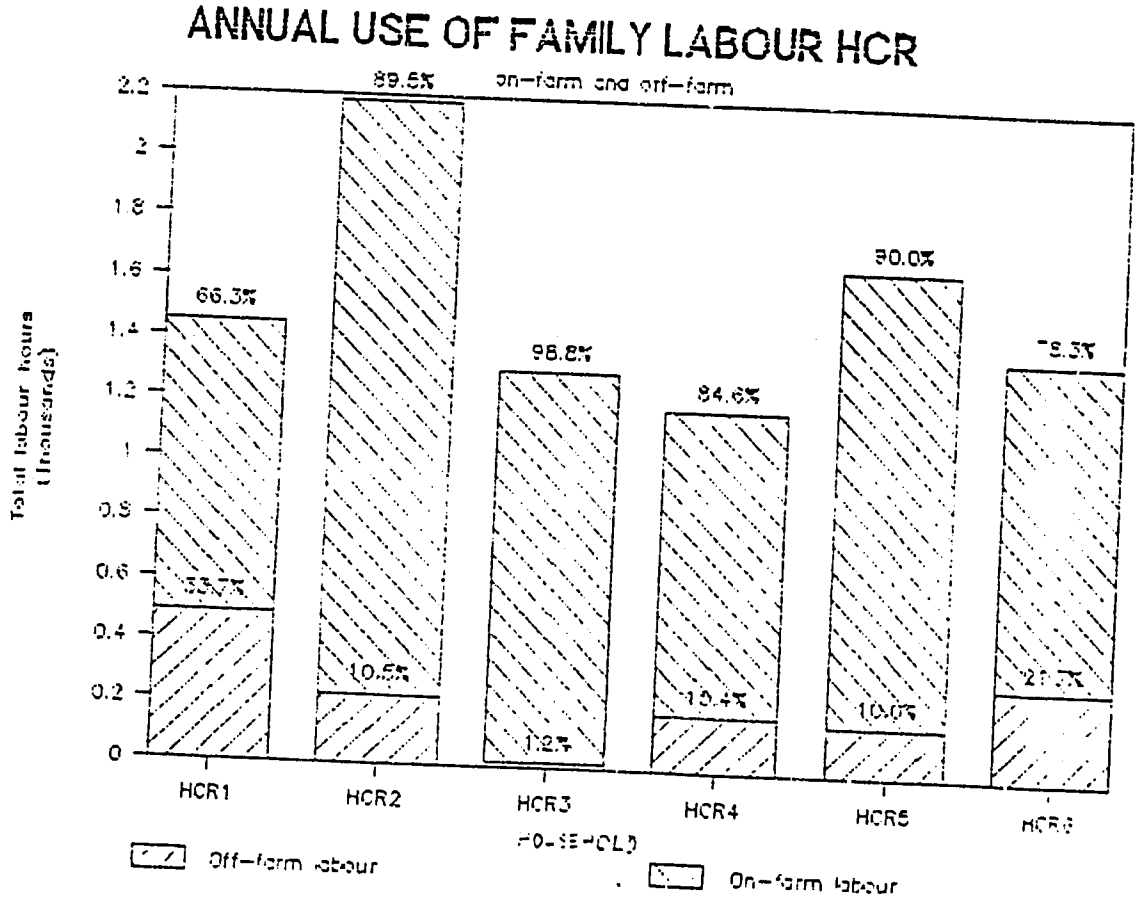


Figure 17

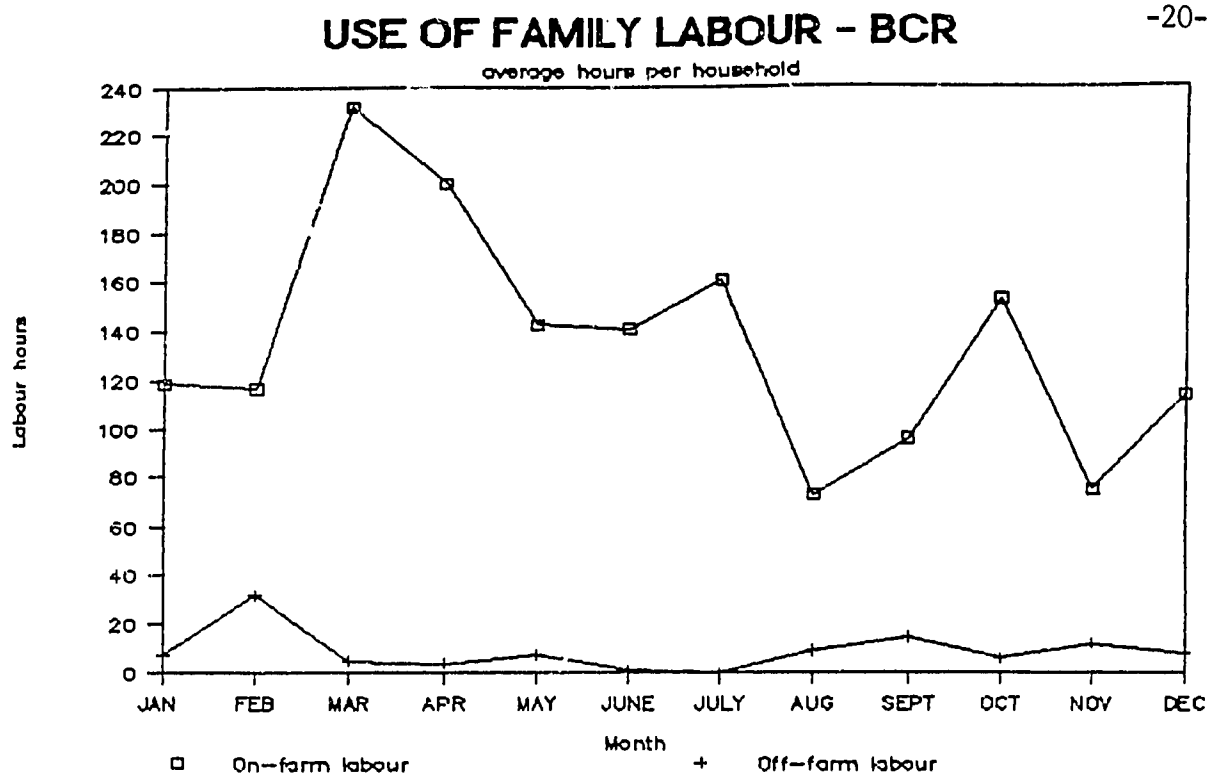


Figure 18

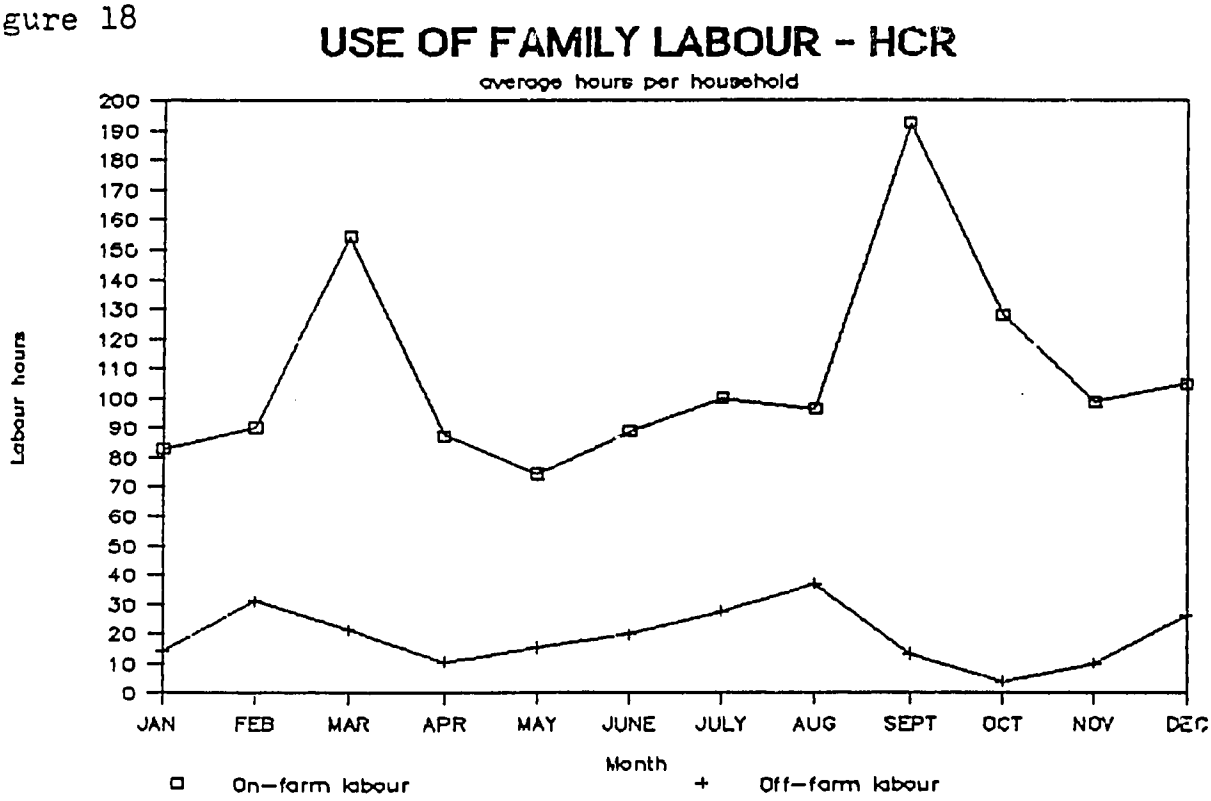
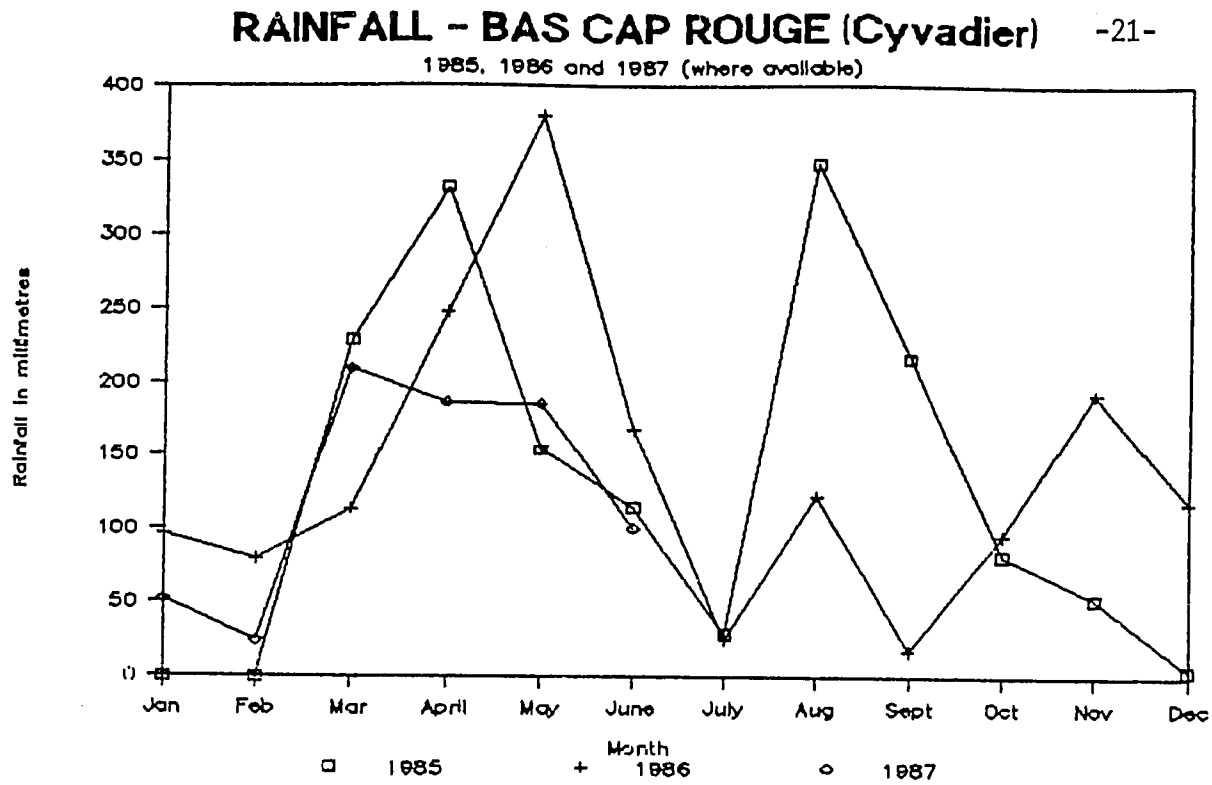


Figure 19


RAINFALL - BAS CAP ROUGE (Cyvadier)
1985, 1986 and 1987 (where available)
Rainfall in millimetres
400
350
300
250
200
150
100
50
0
Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
1985
1986
1987

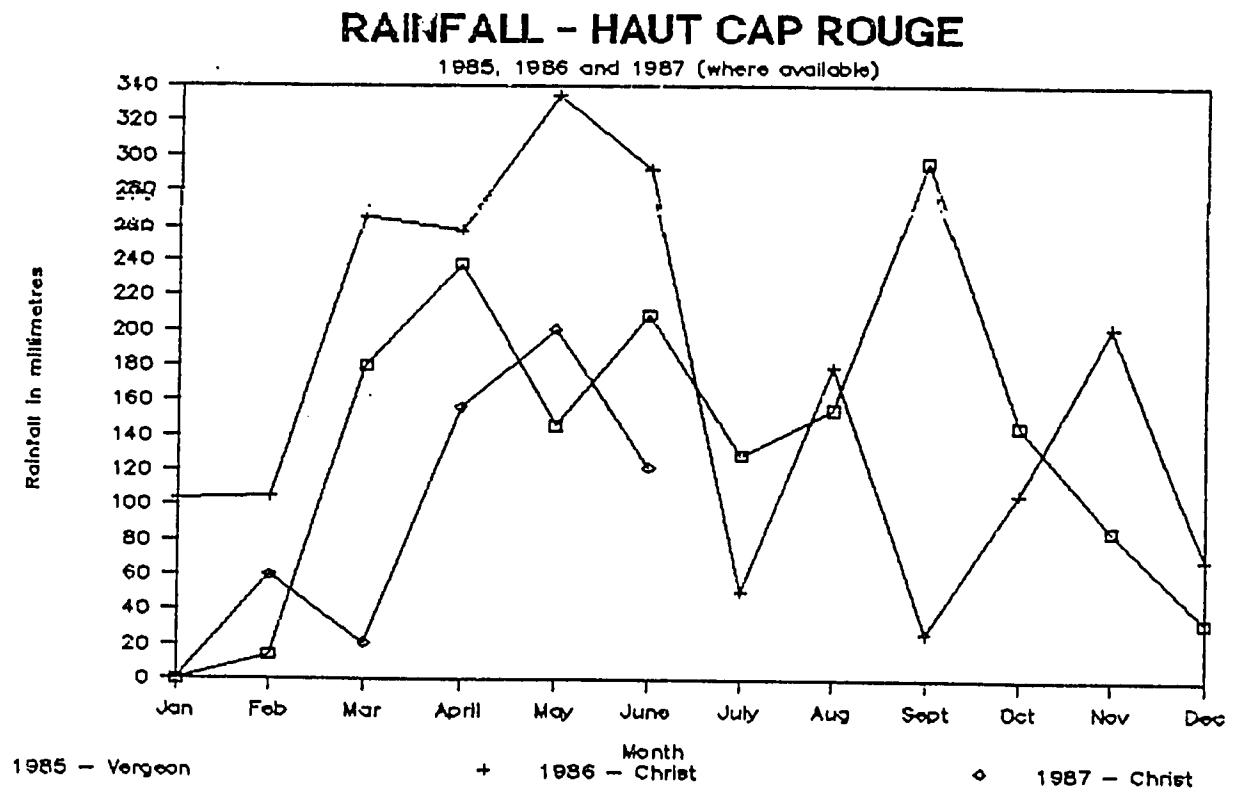

RAINFALL - HAUT CAP ROUGE
1985, 1986 and 1987 (where available)
Rainfall in millimetres
340
320
300
240
220
200
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
1985 — Vergeon
1986 — Christ
1987 — Christ

Figure 20

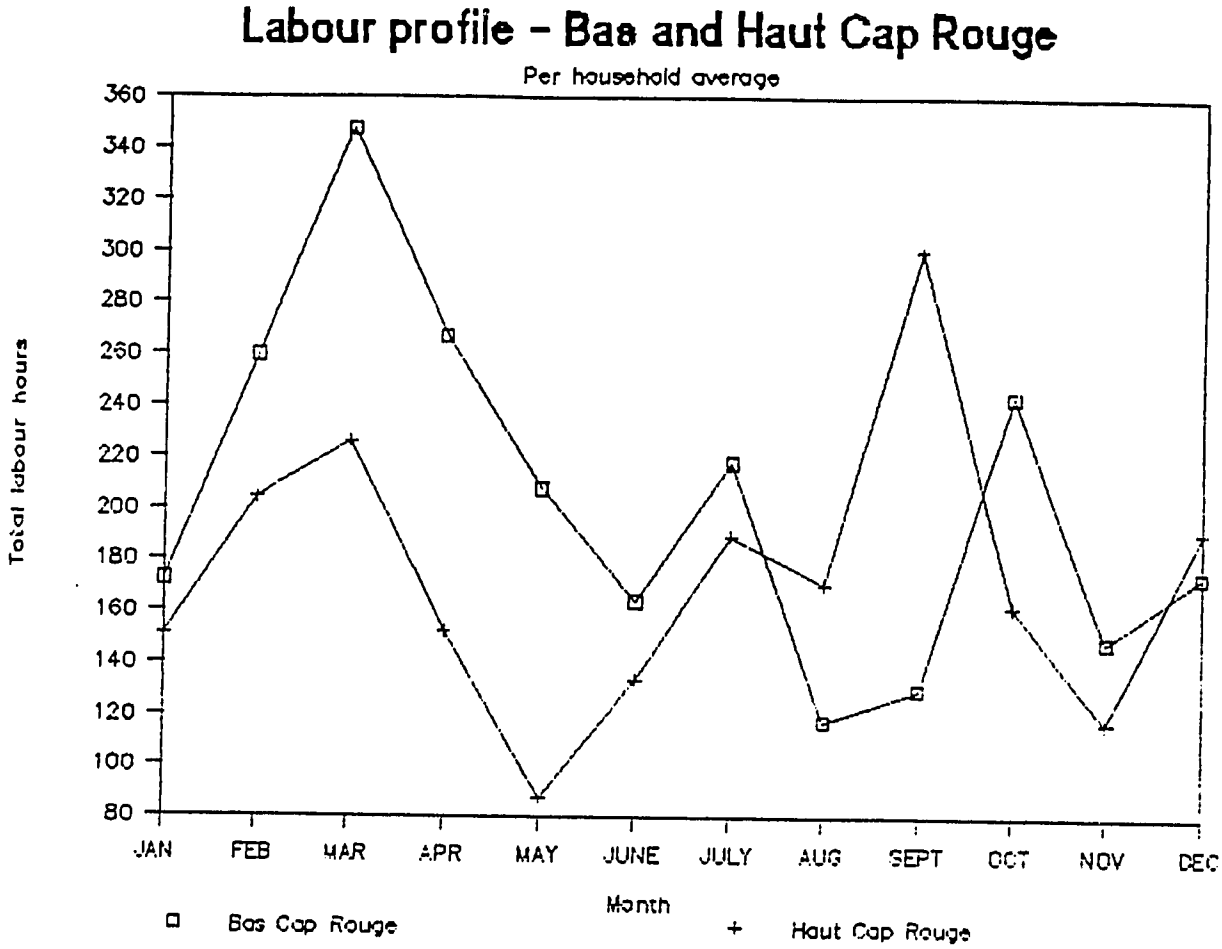

Labour profile - Bas and Haut Cap Rouge
Per household average
Total labour hours
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
Month
Bas Cap Rouge
Haut Cap Rouge

Figure 21

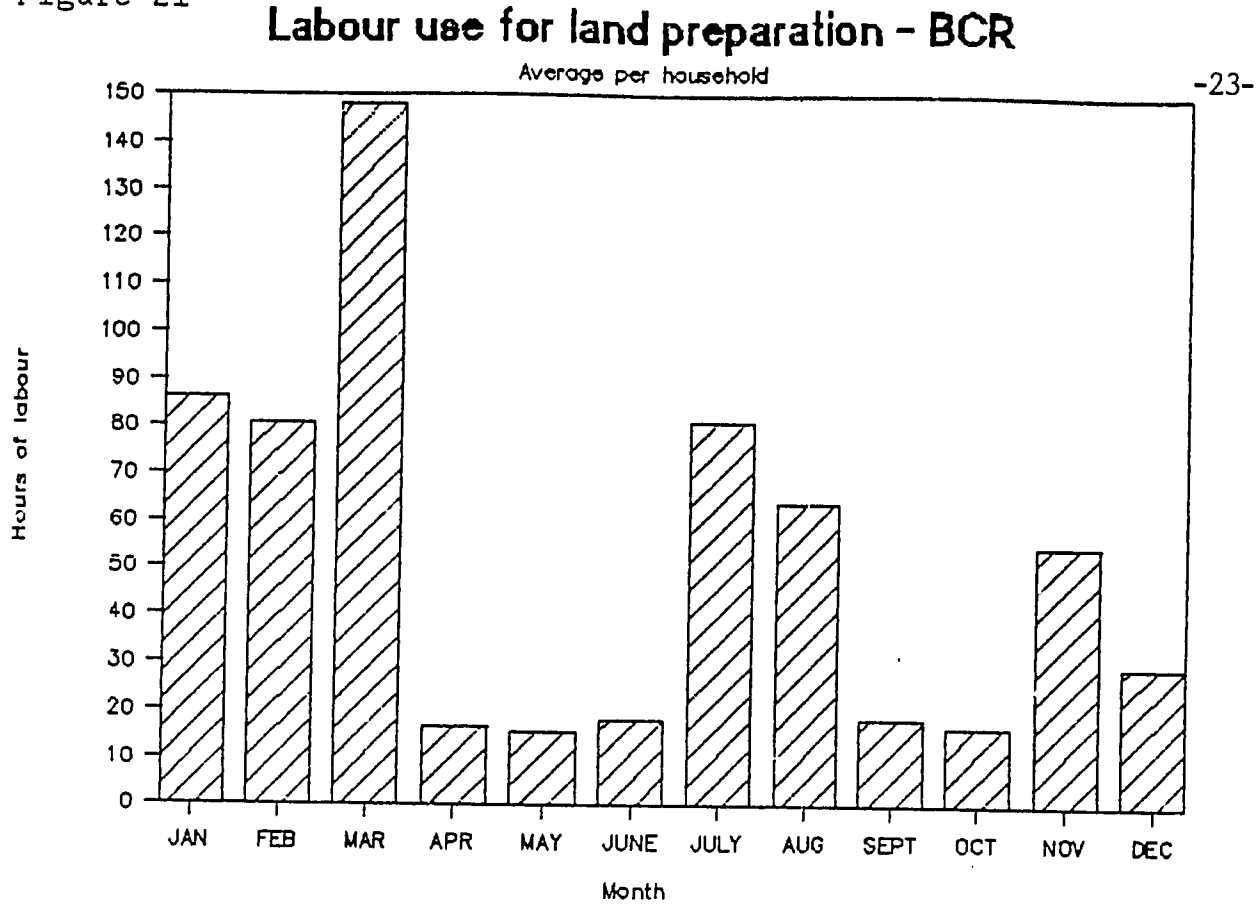


Figure 22

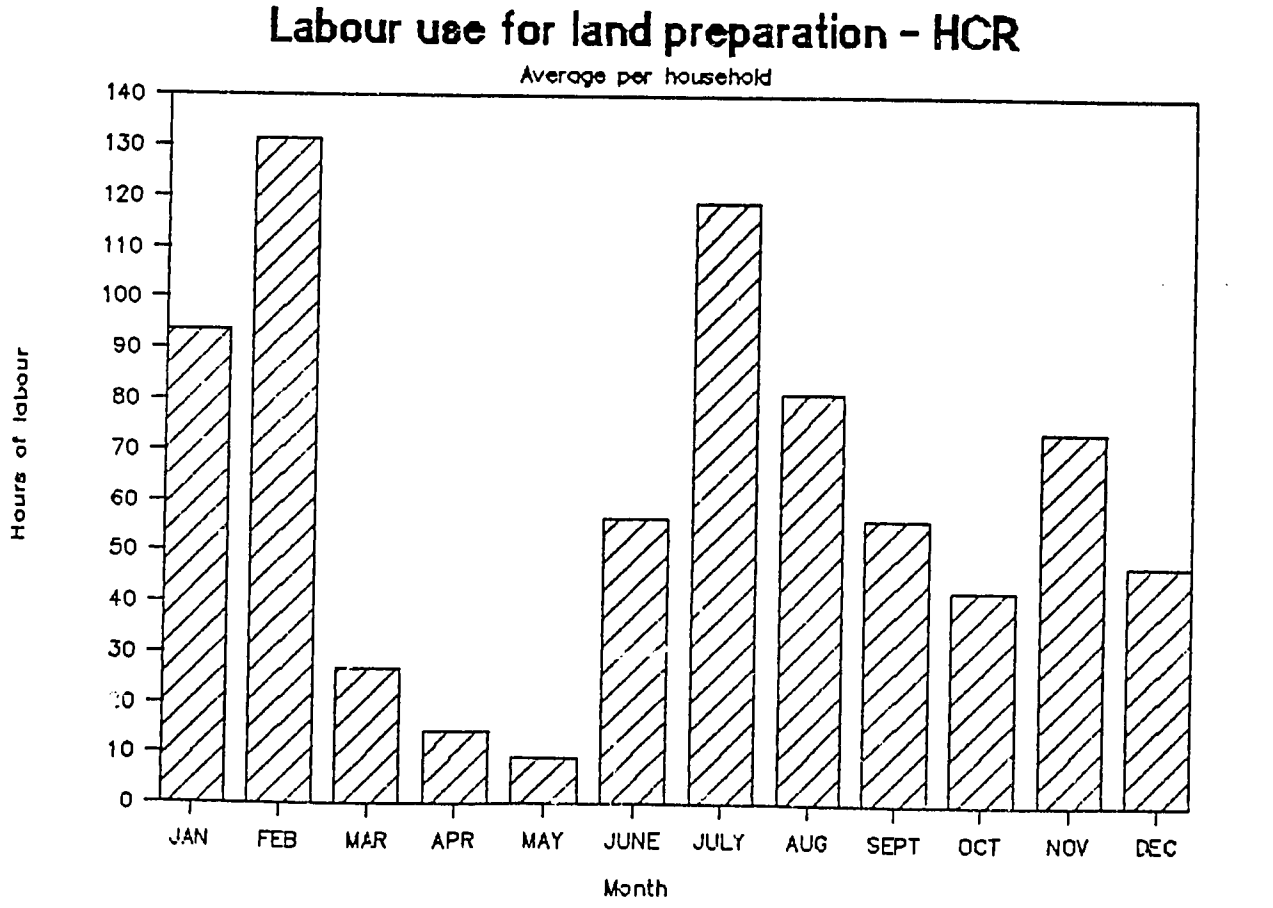


Figure 23

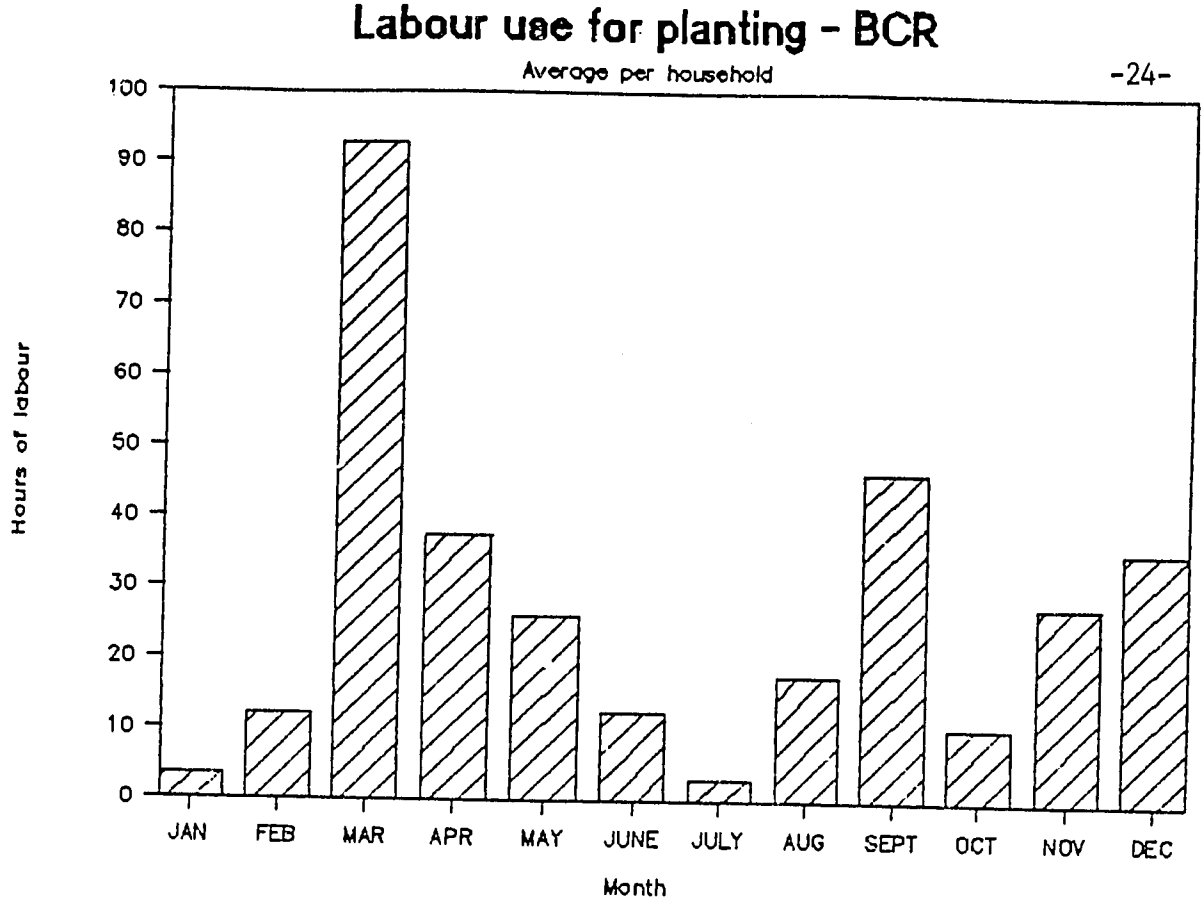


Figure 24

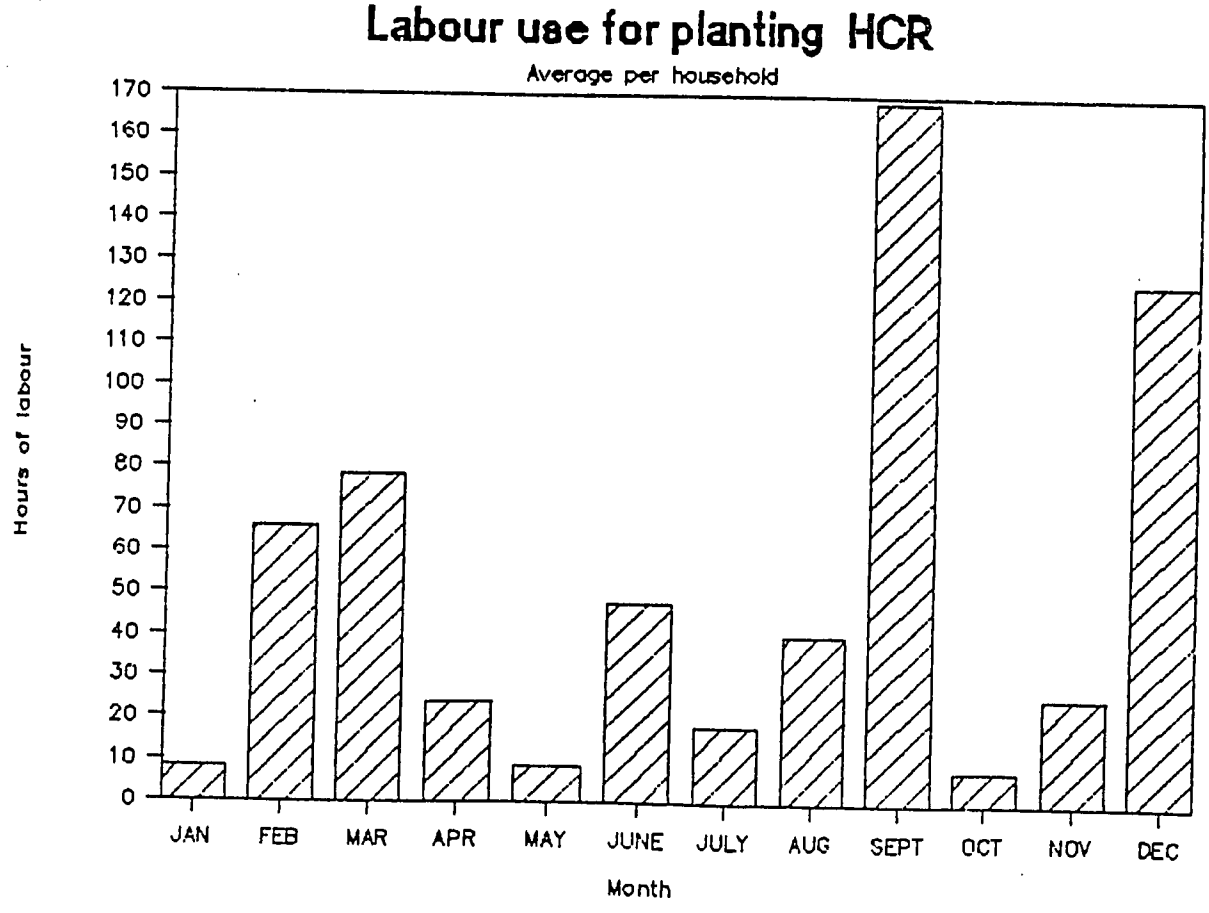


Figure 25

Figure 26

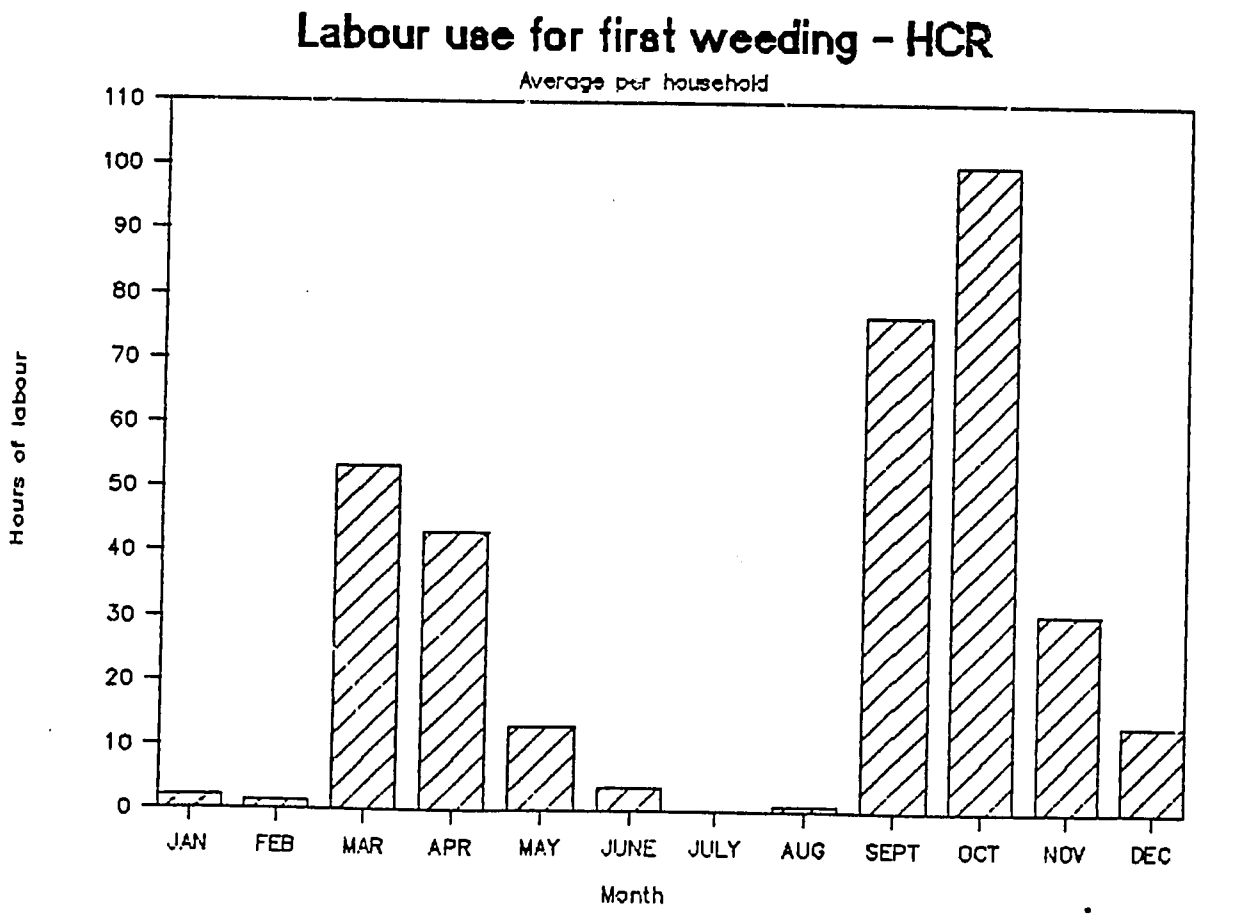


Figure 27

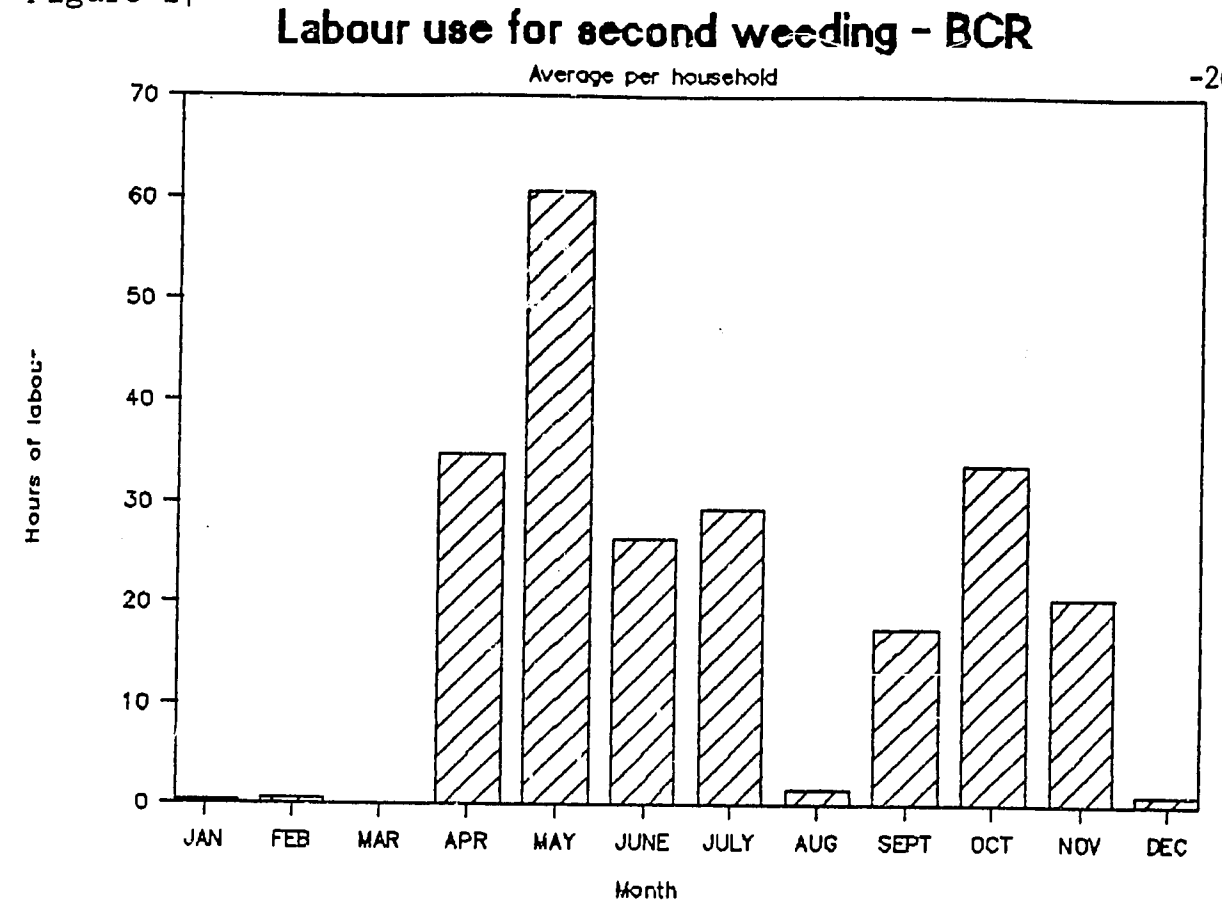
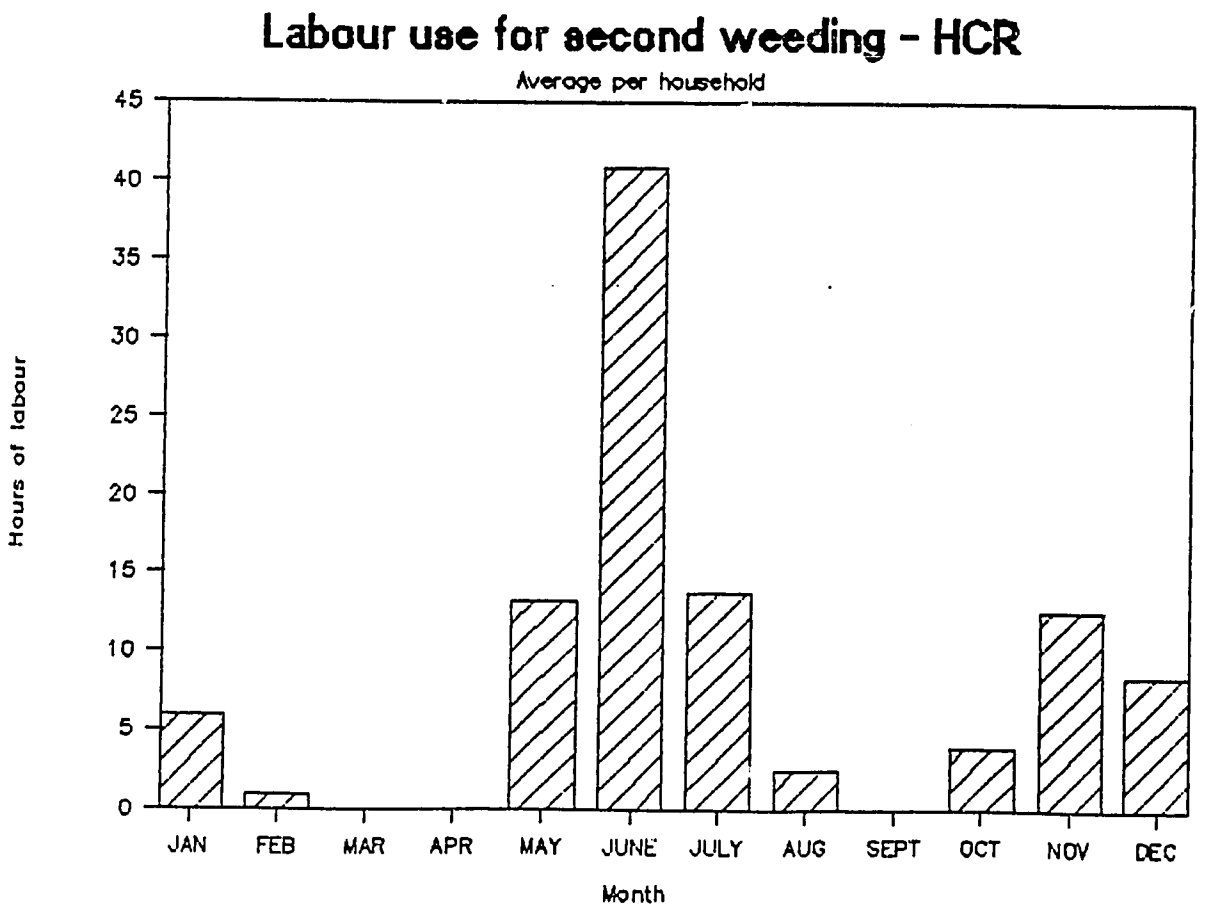


Figure 28



The average labour profiles in Figure 20 include all labour types and all on-farm activities. The profile for Bas Cap Rouge is derived from the 6 analyzed households, whilst that for Haut Cap Rouge is from all 12 surveyed households. There is clearly a fairly close correspondence in labour use patterns between the two zones, with higher labour use in BCR for the first season and in HCR for the second.

These aggregate curves are broken down into their major component parts in Figures 21 through 30, which show labour use for the main cultural operations -- land preparation, planting, weeding (first and second) and harvesting. The difference between the total of these and the aggregate curves in Figure 20 represents labour expended in other less demanding operations -- irrigation, staking of yams or tomatoes, preparation of sweet potato cuttings, dry wall construction and a host of other activities.

Together with the examples of cropping calendars presented in Figures 31 through 36 (3 for each zone), these give a picture of which activities are being performed at which time of year and for which crop(s). The cropping calendars have been constructed for individual households on the basis of labour use. Each column represents a month, divided into 4 weeks. A symbol indicates that a particular activity was performed in the given week (regardless of the number of hours worked). This is based on all parcels and all crops cultivated by the household, although where data for a particular crop is very incomplete it may have been excluded. It should be remembered that data for the months of November and December is taken from 1986, and the remainder from 1987 (see Section 2.5).

First, a brief discussion of the main cultural operations.

a. Land preparation

This is carried out principally prior to the onset of rains and starts earlier, particularly for the first season, in HCR than BCR. The second season is much more important on the plateau than on the plain.

Broadly speaking, HCR land is prepared in both seasons for associations of corn, red beans and sweet potato, with perhaps yam in the first season, and sorghum added around May-June. In BCR, the most important first season association is corn with cowpea, often with the inclusion of manioc and sweet potato. Sorghum may be added later in the year. Labour use for soil preparation is diminished in the second season, for renewed plantings of corn, manioc and sweet potato.

A small peak is evident in November for land destined for the plantation of sweet potato and manioc, to take advantage of the final rains before the dry season commences.

b. Planting

The profiles for planting naturally follow the same pattern as land preparation. The peak in BCR in March is for corn/cowpea/manioc, that in HCR in September for corn/beans/sweet potato.

c. Weeding

Weeding requirements are much higher in BCR than in HCR,

Figure 29

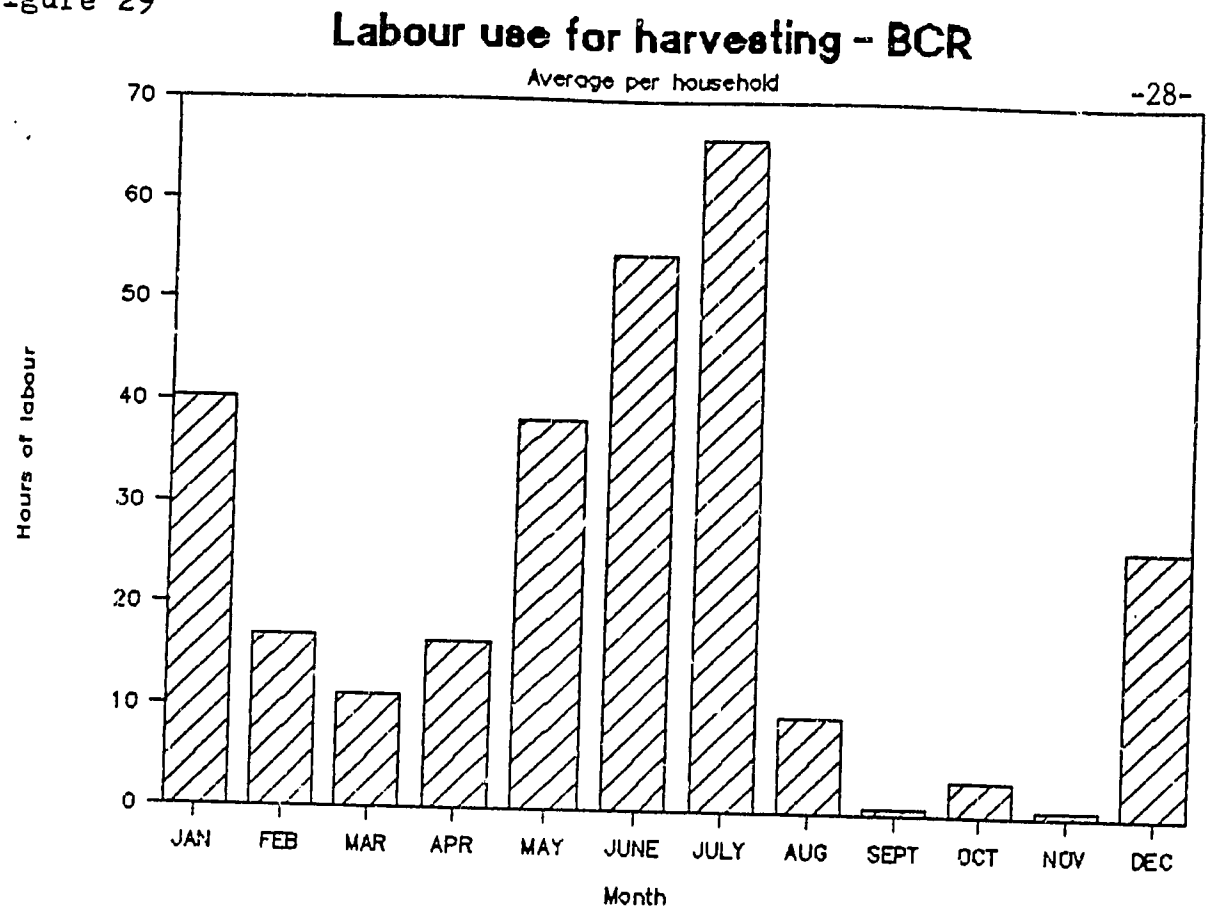


Figure 30

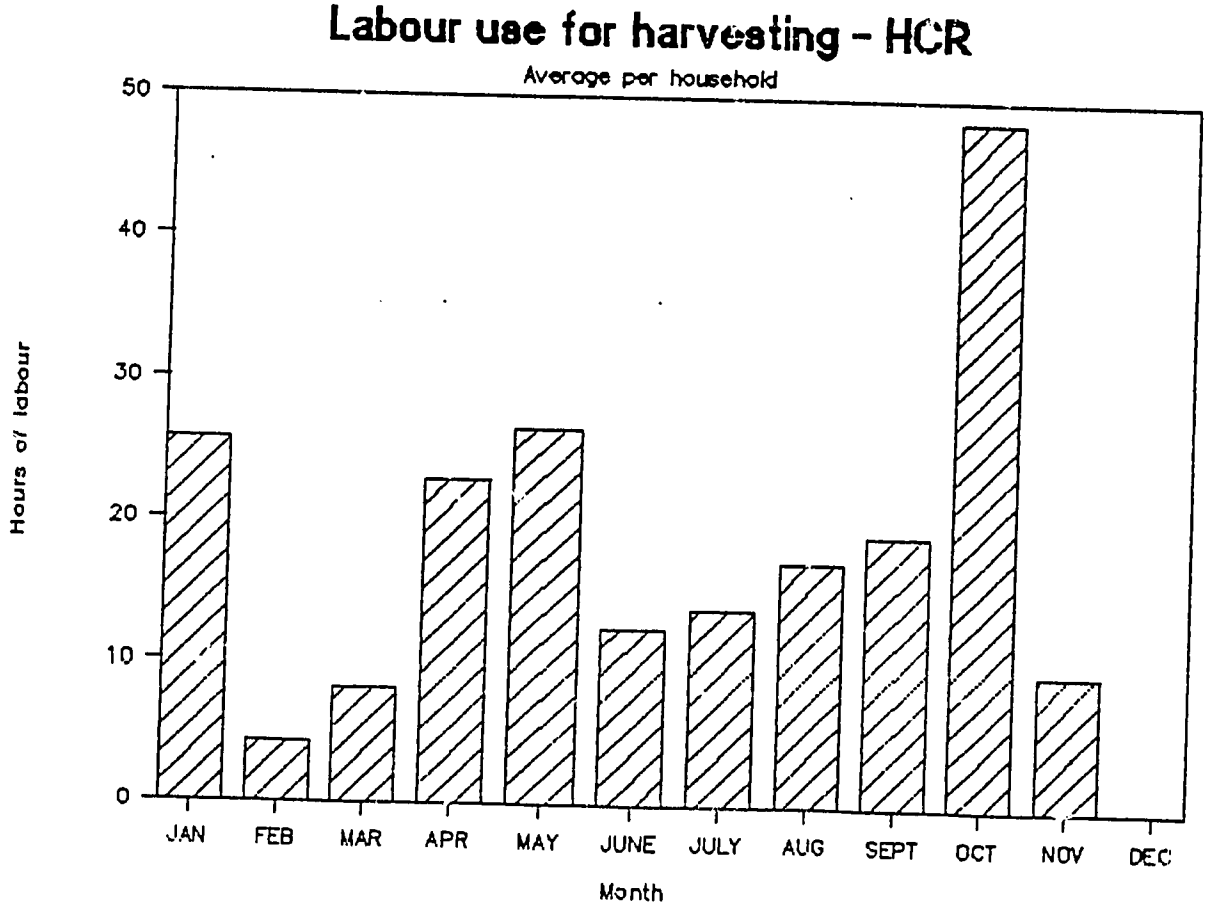


Figure 31

CROPPING CALENDAR - HCR1

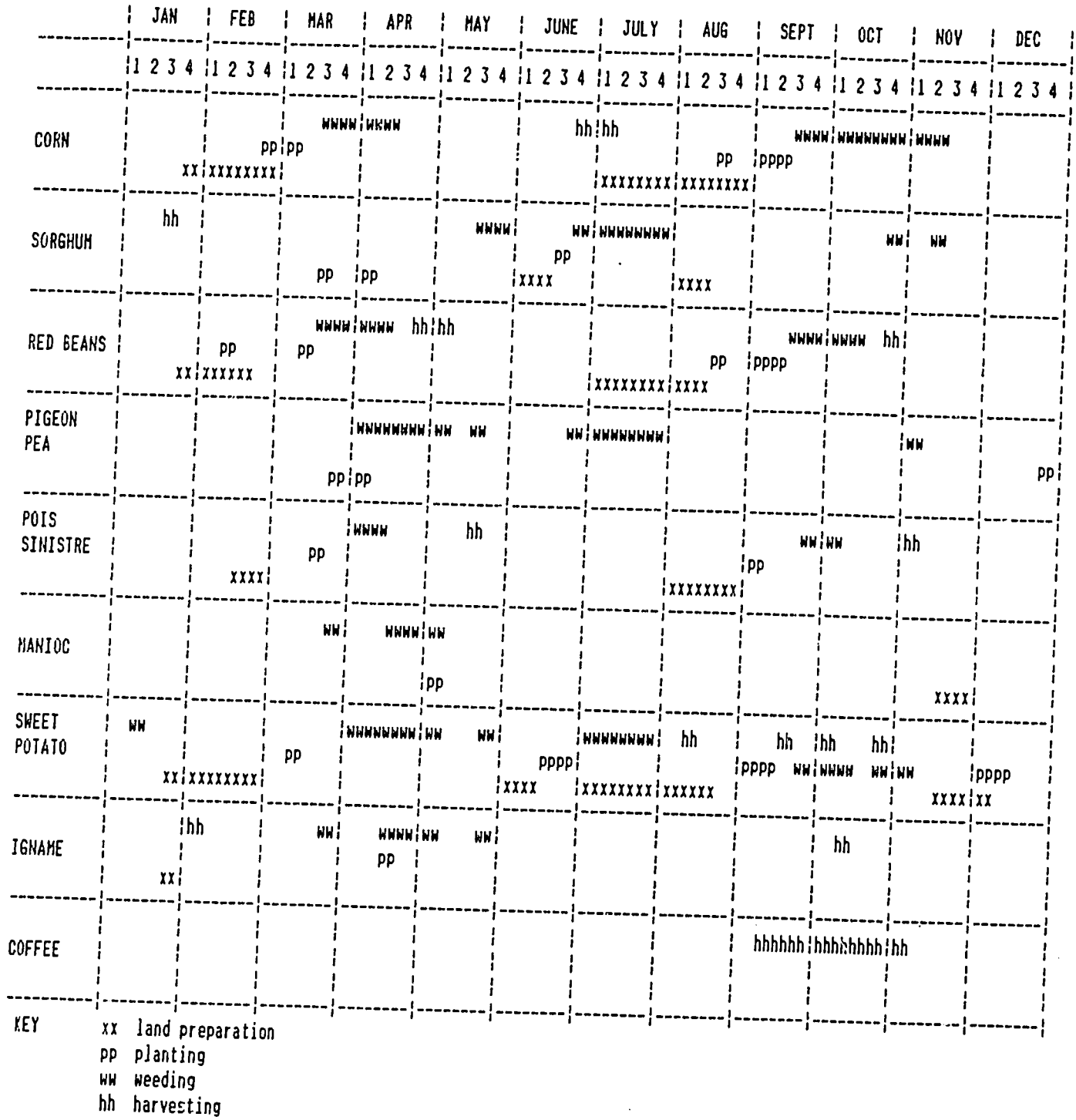
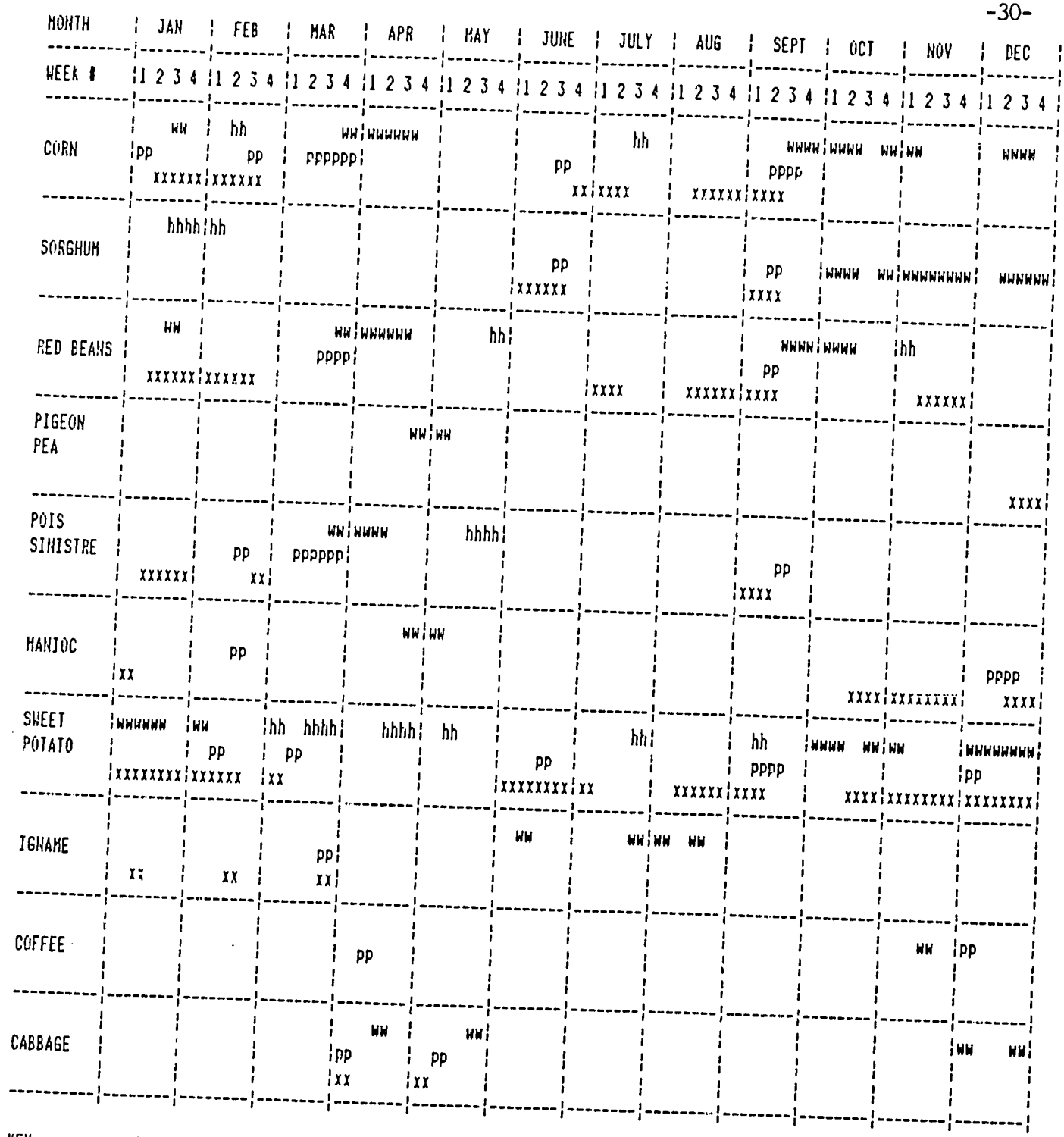


Figure 32

CROPPING CALENDAR - HCR2



KEY

xx land preparation
pp planting
ww weeding
hh harvesting

Figure 33

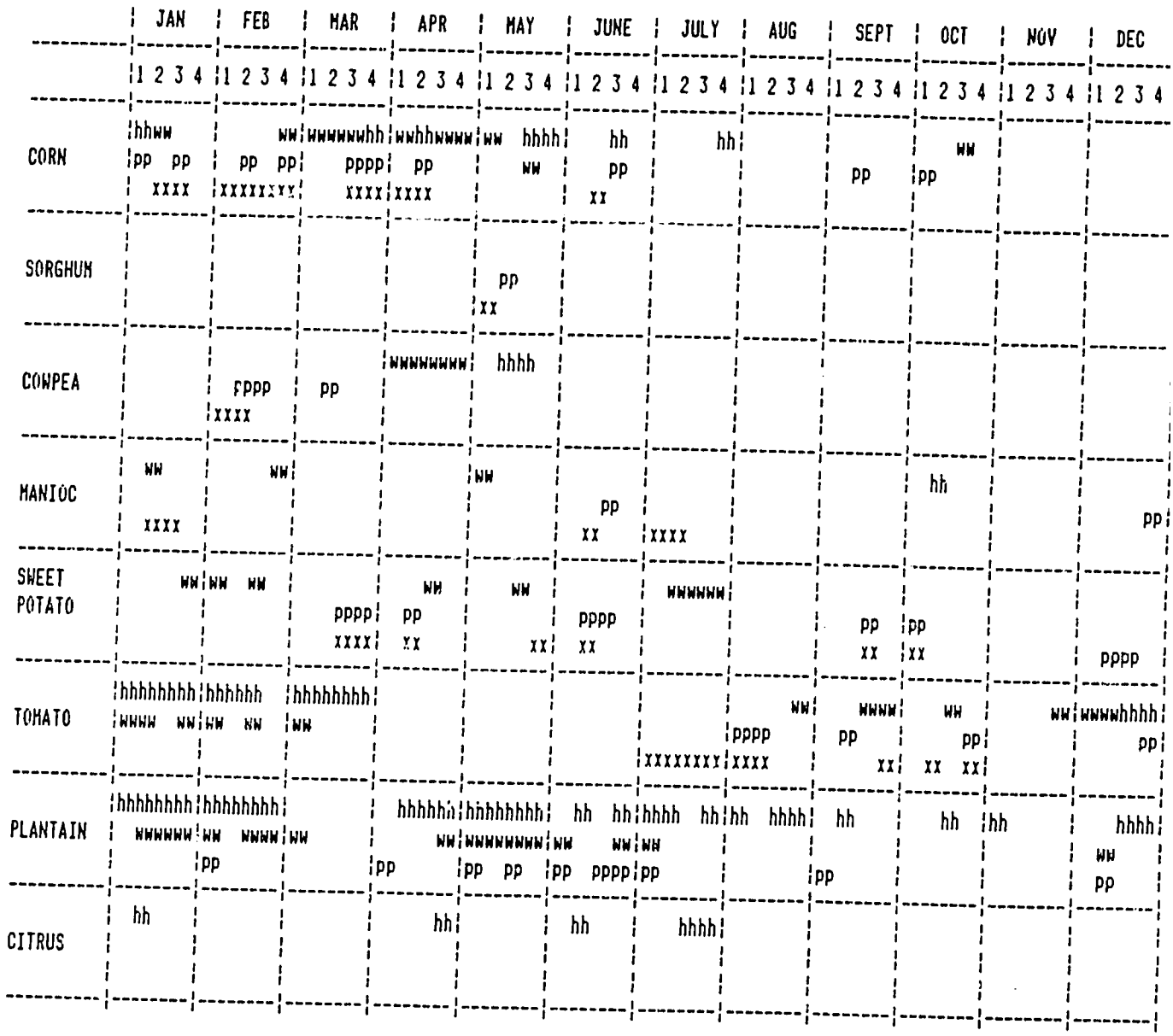
CROPPING CALENDAR - HCR3

	JAN				FEB				MAR				APR				MAY				JUNE				JULY				AUG				SEPT				OCT				NOV				DEC			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
CORN						pp			wwww		pp		pp						ww		wwhh		hh						hhhh				wwww				ww											
	xxxxxx				xxxxxxxxx				xx				xx										xx		xxxxxxxx				xx		pppp	xx	pp		xx											
SORGHUM		hhhh												pp												xxxxxx			xx					wwww														
													xx																																			
RED BEANS						pp			wwww		pp			hhhh			hh													pppp			wwww	pppp			ww	hh	hh								
	xxxxxx				xxxxxxxxx				xx														xx	xxxxxxxx				xx	xx			xx														
PIGEON PEA																																									pp				pp			
																																												xx			
MANIOC	pp																																								pppp		pp						
																																												xx			
SWEET POTATO																							xx				xx				pppp				ww						xx		pp			ww		
																													xxxxxx				pp								xx				pp		
IGNAME						pp											wwww		ww																													
	xxxx				xxxx																																										
COFFEE																					wwww												hh	hhhh			hhhh				pp							

KEY
- xx land preparation
- pp planting
- ww weeding
- hh harvesting

Figure 34

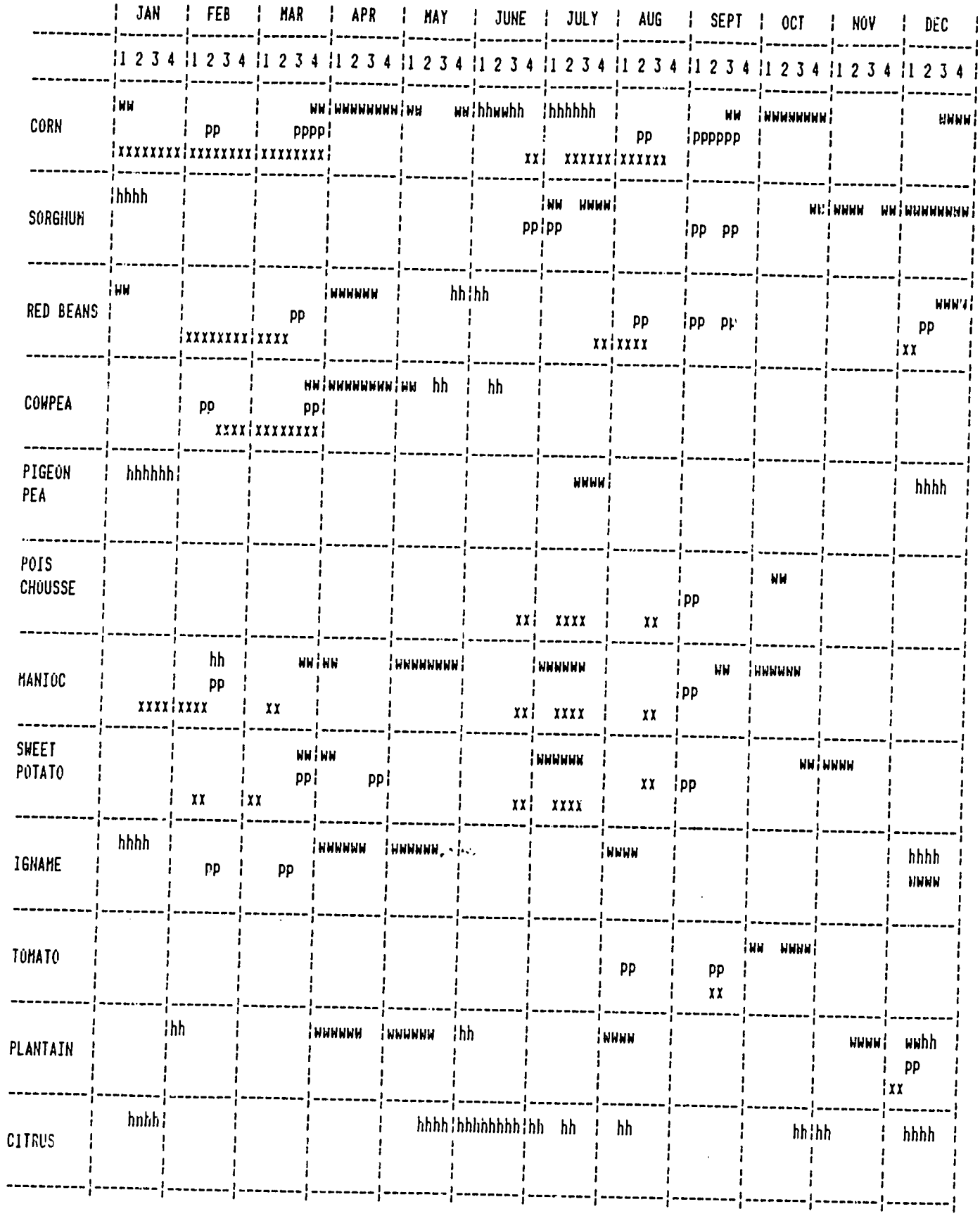
CROPPING CALENDAR - BCR5



KEY
xx land preparation
pp planting
ww weeding
hh harvesting

Figure 35

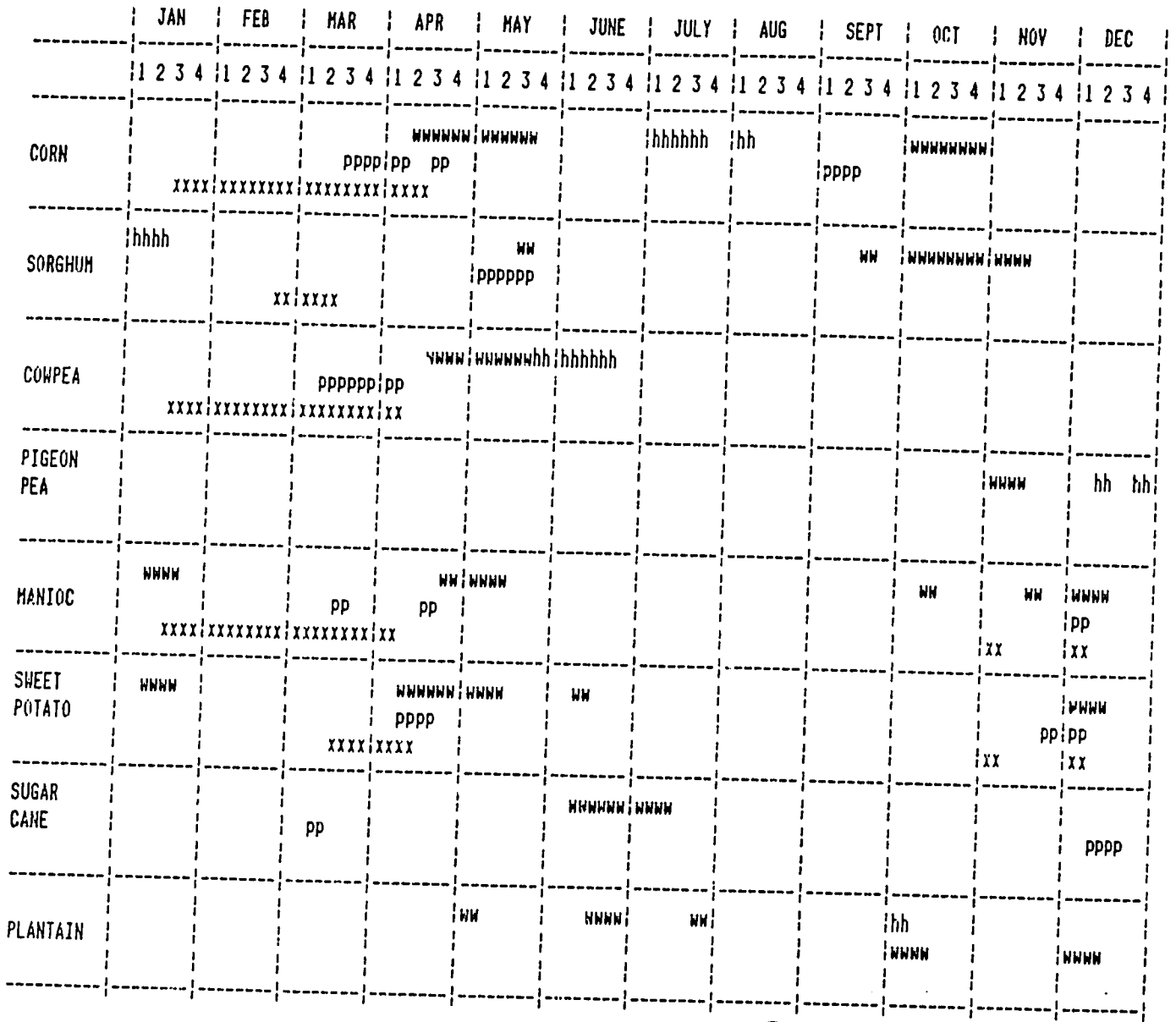
CROPPING CALENDAR - BCR6



KEY xx land preparation

Figure 36

CROPPING CALENDAR - BCR8



KEY
- xx land preparation
- pp planting
- ww weeding
- hh harvesting

and spread over a longer period of time. This can be explained by the higher availability of water in the plateau, which means that competition between crops and weeds for moisture is not so great, and weeding therefore not as critical for crop survival.

d. Harvesting

Harvesting in BCR is concentrated around December/January (for corn and sorghum) and May/June/July for corn and cowpea, with a trough in between. The harvesting profile in HCR is rather more even through the year, with peaks in May and October for beans and in January for corn and sorghum. Coffee harvesting is important in September/October. There is no distinct harvesting season evident for the tubers, which are generally collected as and when the need arises.

5.3 The importance of different crops and associations

This section draws on a number of different analyses -- the figures already presented, as well as those included in Appendices 3 and 4. Appendix 3 provides a set of figures summarising, for the households analyzed, information collected in the land inventory made at the start of the survey. They indicate the crops cultivated on each plot operated by the household and its reported area, along with a count of the number of plots on which each crop is found. Appendix 4 provides similar figures, but based on information collected during the measurement of plots in the first season of 1987, for those households for which the majority of plots were measured. Here, calculations are made of the area per crop assuming, first, allocation of 100% of plot area to each crop in the association ("total" area) and, second, division of plot area equally between all crops (and fallow) present ("crop" area).

1. Corn/beans association

Corn is the most common crop, cultivated in both zones and in both seasons, and generally found on between 1/3 and 2/3 of the total land area of a holding (although, because universally grown in association, occupies from 10% to 20% of "crop" area).

In Haut Cap Rouge corn is grown almost without exception in association with red beans (Phaseolus vulgaris) in both seasons. This association is the most demanding in terms of water and organic matter. It is therefore most frequently found on the best land, on valley bottoms and the flatter plateau areas, and given priority for planting when the first rains fall. This enables beans to be harvested before the heavy rains in May, and corn to avoid the dry period of June-July at the flowering stage. The same holds for the second season (the rains in October, and dry in December). Pois sinistre may also be included in the association.

In Bas Cap Rouge, red beans cannot normally be cultivated, because the high temperatures lead to problems of pest attack. Cowpea (Vigna unguiculata) is grown instead in the first season, on areas about half those of corn. Cowpea is not usually grown in the second season, during which other bean varieties might be associated with the corn, notably pois souche

(Phaseolus lunatus). The few parcels of red bean cultivated by BCR farmers are either irrigated fields planted in the lower-temperatures of the off-season, or are in fact planted on higher ground towards or on the plateau (the case for BCR 6).

Irrigation also allows flexibility in the time of planting for corn (BCR 5), where planting extends from early January through April, and harvesting from late March through June. Bas Cap Rouge farmers without irrigation may face the problem discussed for Haut Cap Rouge; that is, the coincidence of flowering of corn with the June dry period.

2. Sorghum/pigeon pea association

Sorghum is planted by all HCR households and generally after the corn and beans, between April and June. Areas planted are similar to those devoted to corn in the second season, with which it is sometimes associated.

The sorghum/pigeon pea (Cajanus cajan) association is much less demanding of soil fertility and water than corn/beans, and therefore is generally found on the poorer, drier and steeper areas. Alternatively, they may be planted as part of a corn/beans/sweet potato association and, without having adversely influenced the first season crops, remain in the ground after the first season harvest to complete their growing season. HCR 11 is an example of a household relying heavily on sorghum and pigeon pea, in association with other more demanding crops on only one plot. They occupy nearly 50% of total area (or 12% of "crop" area), suggesting a particularly disadvantaged farmer. In the other cases, the association is not so predominant and is found together with other crops. Sorghum/pigeon pea is fairly common in the BCR second season, in association with manioc (BCR 8) and corn (BCR 9), or alone in a number of cases. Planting of sorghum is delayed relative to corn in order to reduce competition for scarce water. Pigeon pea may be planted at the same time as the sorghum, or together with manioc/sweet potato. Harvesting of sorghum is in January, and pigeon pea in November through January (BCR 6 and BCR 8).

3. Tubers

a. Yam, the most demanding crop, is cultivated by all HCR households (with the exception of HCR 11) either in association with corn or around the "lakou" (courtyard) along with coffee, plantains, fruit trees and other tubers such as taro. The proportion of total area ranges between 10 and 30% or 2 - 6% pf "crop" area.

In the plain, yam is much less widespread, in only one case (BCR 12) being found on more than one parcel.

It is harvested in October, with a part of the tuber being left in the ground until February to serve as planting material.

b. Sweet potato and manioc, less demanding crops, can be planted at any time of year, providing there is a minimum quantity of soil moisture. In HCR, manioc is usually found on 15 - 25% of total area and sweet potato on up to 40%. They are particularly important for HCR 11, occupying some 60% and 40% of total area respectively. They are usually found in associations of corn, beans, pigeon pea and yam, either individually or

together. In BCR, sweet potato is rather less common, grown on fewer plots and smaller areas. Manioc tends to occupy more land, as in the case of BCR 5, where it is planted in association with pigeon pea and pois souche, or corn and sweet potato.

4. Cash crops

Coffee and limes represent important cash crops in HCR and BCR respectively, both requiring low maintenance, and generally located around the lakou. Harvesting of coffee takes place in the September-November period, and of limes throughout the year with peaks in the dry seasons. Plantain in the irrigated plain is a more demanding crop and occupies substantial areas in most BCR households. It is found in association with a range of crops --yam, manioc, corn, beans.

5. Vegetables

The cultivation of tomato is an important off-season activity in BCR, possible with the use of irrigation. Practised by almost all households, land preparation may start as early as July, harvesting continuing through March (BCR 5). It requires high labour inputs for nursery establishment, transplanting, staking, spraying, weeding etc., but is grown on only small areas.

Cabbage cultivation in HCR, although spreading rapidly, was practised by only 2 of the households analyzed. Land preparation and planting occurs in April/May, for harvest in June/July.

5.4 Revenues from cropping enterprises

Data were collected in the total quantities of each product harvested, and the proportions which were domestically consumed, stored or sold. Given the multiplicity of units of measurement as well as the absence of data from certain enterprises, it is problematic to produce an accurate analysis of product disposal. However, some estimates and broad observations can be made.

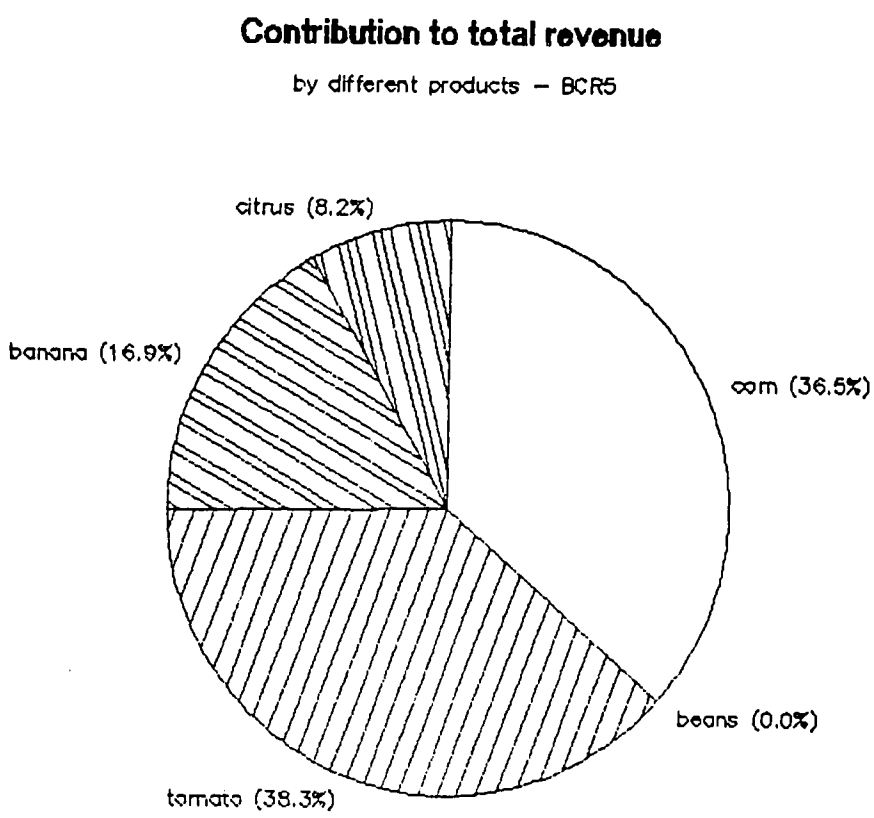
Figures 37-44 present estimates of the proportion of total revenue (from crop sales) contributed by different products, for selected households in each zone. They are derived from revenue figures supplied by respondents for crops actually sold, plus imputed values for products which were put in storage (based on the assumption that stored products were actually or potentially destined for the market). No imputed value was given to produce domestically consumed directly after harvest.

The annual total revenues represented by the charts are fairly similar for three of the four BCR households, averaging 1500 gourdes or $300 per household. For the fourth household, BCR 12, total revenue recorded was only 355 gourdes, or $70. This does not seem a very realistic assessment of gross cropping revenue from a 1.8cx holding, especially one with relatively large areas of yam and banana and a large pig-raising enterprise.

In Haut Cap Rouge, total annual revenues estimated were higher, in 3 cases out of 4 being greater that 2000 gourdes (on average 2200 gourdes or $440). The fourth case (BCR 2) showed a slightly lower revenue of 1500 gourdes ($300).

Looking at the revenue charts for Bas Cap Rouge, one sees

Figure 37



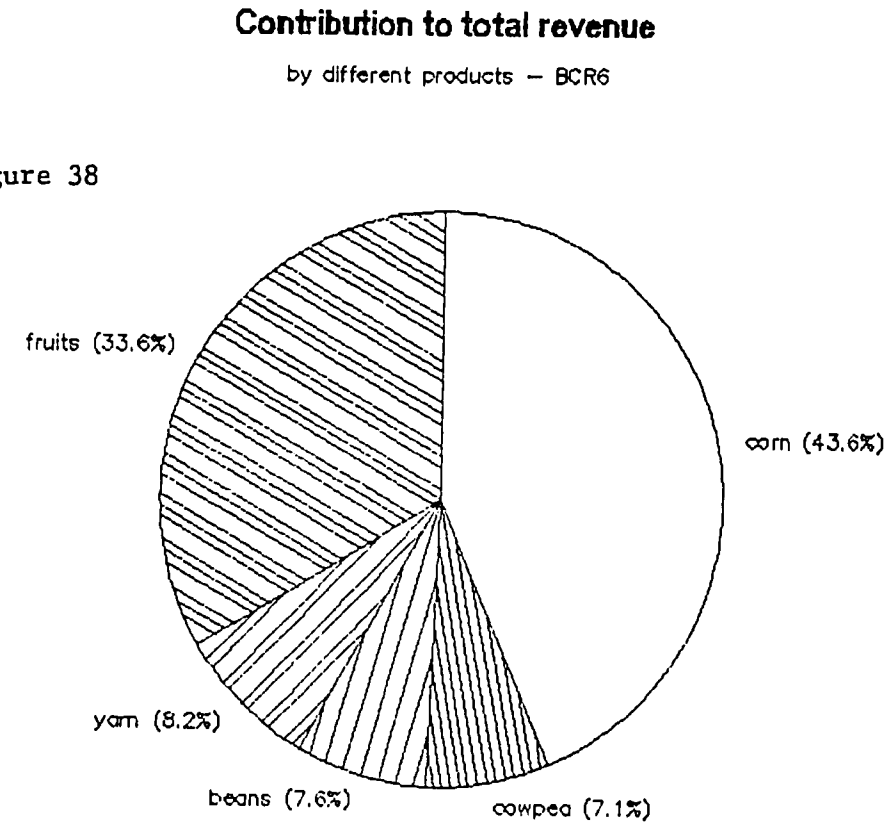


Figure 38

Figure 39

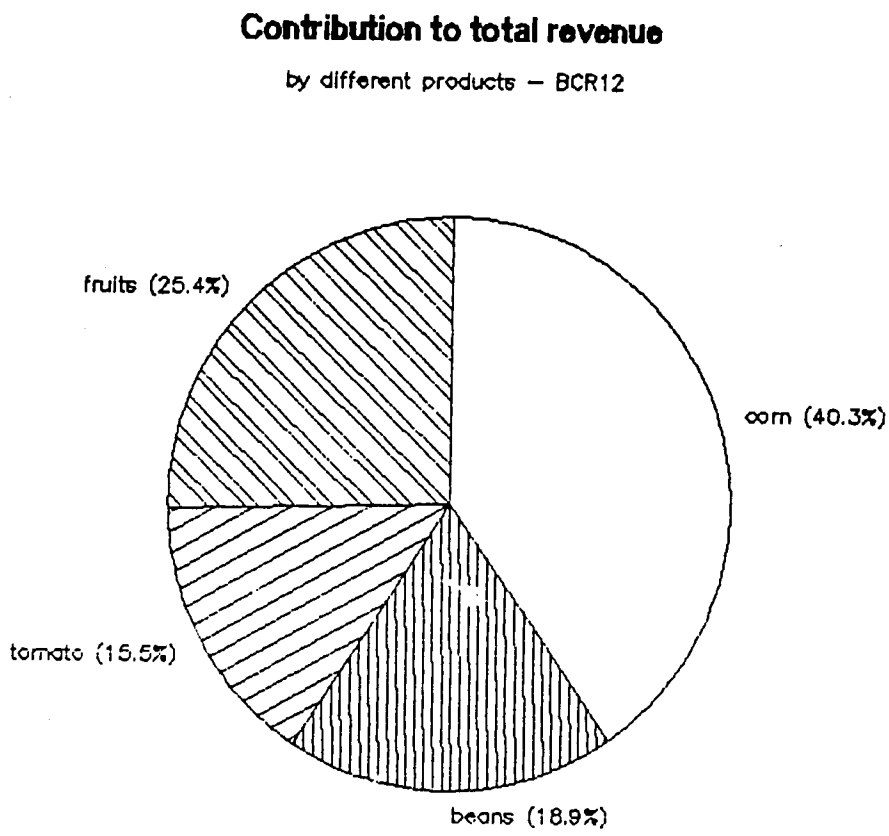


Figure 40

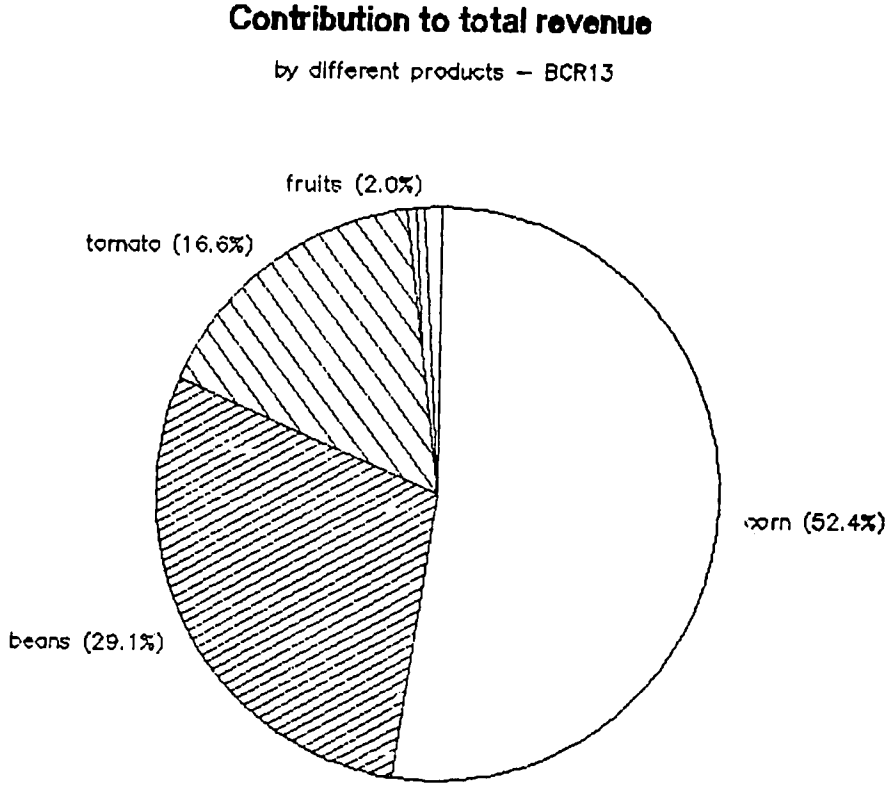


Figure 41

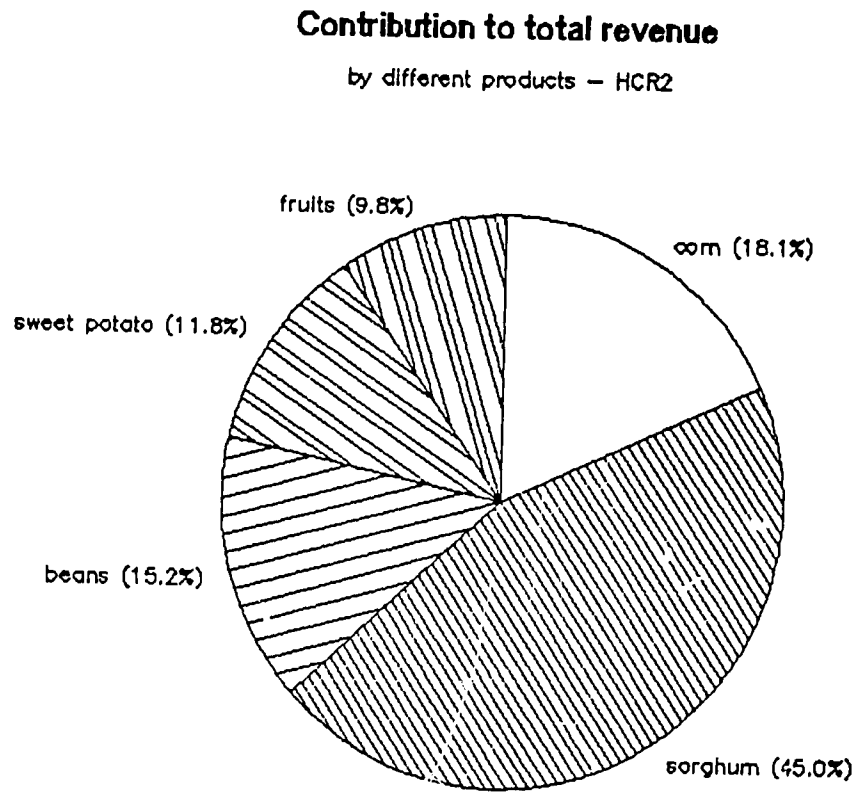


Figure 42

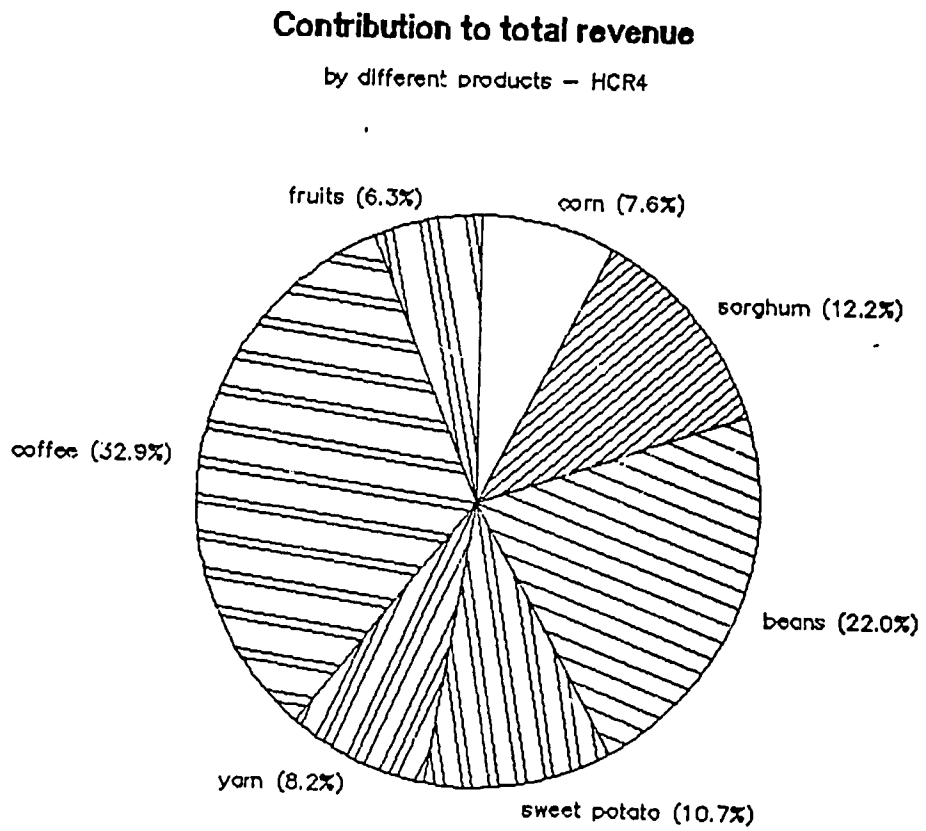


Figure 43

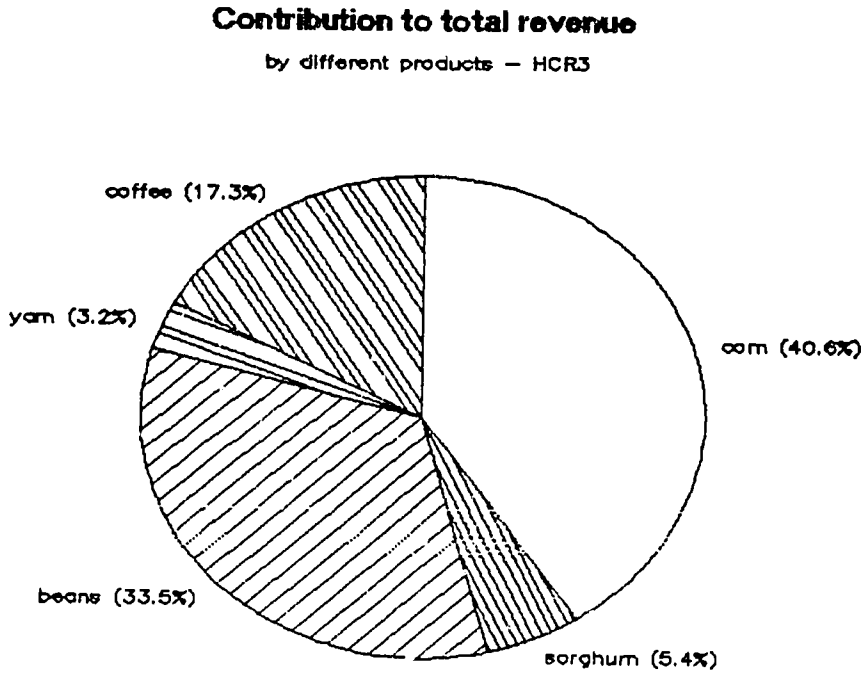
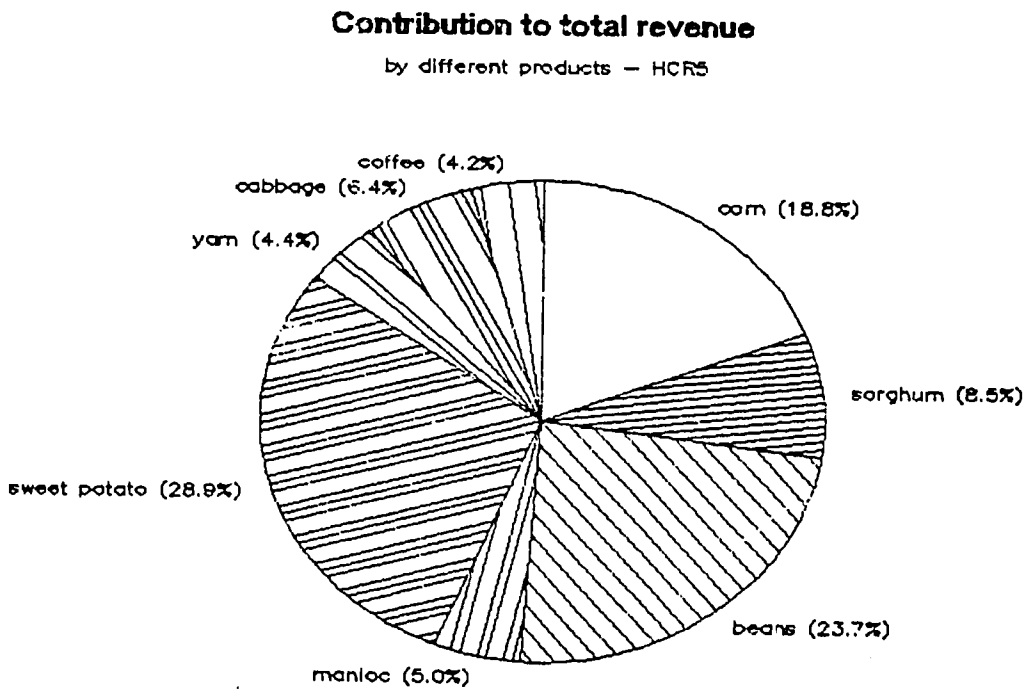


Figure 44



2that corn provides a large proportion of total revenue in all cases (between about 35% and 50%). A large portion of the corn harvested was commonly stored (5 out of 6 households); BCR 6 was the only household to sell a large part straight after harvest. Beans are important revenue sources in 3 of the 4 cases shown (15% - 30% of total revenue), despite the fact that in two of them the major portion of the pigeon pea and cowpea harvest was domestically consumed. For BCR 5, there was no revenue from beans -- all was consumed. BCR 6 and 8 stored a high proportion of cowpeas. Tomatoes serve to replace beans as a cash source for BCR 5, although obviously cannot be stored for later sale. They are sold 100% of the time, and provide a higher revenue than corn in this case. Tomatoes are also important for BCR 12 and 13 (around 15% of total revenue). The final major component for BCR 5 is banana/plantain, contributing some 17% of revenue as well as being consumed in a quantity roughly equal to that of sales. For two of the cases presented, fruits -- mostly limes, but also coconuts (BCR 12), papaya, grenadia and corossol (BCR 6) -- are a major element in revenue. Absent from the BCR charts are sorghum, which is destined entirely for home consumption, and tubers, which were sold only in the case of BCR 6.

Sources of crop revenue are generally more diverse in Haut Cap Rouge, with the households shown in Figures 41-44 having between 5 and 8 major different categories. All households store and sell a large proportion of their corn and sorghum harvests, especially the letter, of whcih 90 - 100% is stored in all cases. HCR 2 shows a particularly large contribution by sorghum (45%), which can be accounted for by the large area harvested at the start of 1987. Beans contribute between 15 and 35% of revenue . A higher proportion of red bean is consumed domestically than for the grains (approximately 5 - 25%), but the major part is stored, presumably for sale. In contrast, pigeon pea is grown mainly for home consumption (BCR 4 and 6) or half and half for consumption and sale; pois sinistre is stored by all 3 households cultivating it. Amongst the tubers, grown by all households, sweet potato represents the prinicipal marketed product. Contributing between 10 and 30% of revenue for 3 of the households in the figures, the ratio of consumption to sale is around 1:2. Two households (HCR 2 and HCR 6) sell either rarely or not at all. Yam, on the other hand, is grown principally for home consumption, providing a significant source of revenue only in the case of HCR 4. The cultivation of manioc amongst these households is destined roughly equally for consumption and sale, but in only small quantities. Coffee, for those households cultivating substantial areas, can be a major cash sourch (as in HCR 4 -- 33%). Banana is the main fruit sold, providing a significant income for HCR 2 and HCR 6, but being mainly consumed in the other households. The other fruit harvested in large quantities, breadfruit, is in all cases but one (HCR 2) entirely consumed within the household.

Appendix 1

Enqueteur_____

Zone_____

Habitation_____Menage #____

ENQUETE DE SUIVI DU SYSTEME DE PRODUCTION
MAIN-D'OEUVRE ET INTRANTS

_____Saison 1987

					MAIN D'OEUVRE FAMILLIALE # d'heures sur exploitations							MAIN D'OEUVRE NON-FAMILLIALE sur exploitations du menage			MAIN D'OEUVRE FAMILLIALE Hors de l'exploitation				LES INTRANTS (Semences, engrais, insecticides, pesticides,etc				
DATE Mois/Jour	CODE de l' exploitant	# de Par-celle	ACTIVITE	CULTURE	CH	SEX	CON-JOINT	Enfants <15			Autres total >15 ans	Association/Groupe # de Personnes	Heures Totals	SEXE	Type	'# d' Heures	COUT Especes Gds.	Nature Gds.	TYPE	PROVE-NENCE	QUAN-TITE	UNITE	COUT TOTAL
								1	2	3													

Enqueteur_______________
Zone_______________
Habitation_____________Menage #____

ENQUETE DE SUIVI DU SYSTEME DE PRODUCTION
DONNEES SUR LES PRODUITS

DATE_______________

VEGETAUX

ANIMAUX/VOLAILLE

DATE Mois/Jour	CODE de l'exploitan	# de Par-celle	TYPE de PRODUIT	CULTURE (Code)	QUANTITE RECOLTE	UNITE	QUANTITE CONSOMMEE	QUANTITE STOCKEE	FORME	COMMERCIALISATION QUANTITE VENDU	VALEUR TOTALE	AUTRE	ESPECES	CODE	QUANTITE CONSOMMEE	UNITE	COMMERCIALISATION QUANTITE VENDU	QUANTITE ACHETE	VALEUR TOTALE

Appendix 2 - Time period of data for households included in the analysis

Haut Cap Rouge

HCR 1	30.10.86	-	6.11.87
HCR 2	29.10.86	-	6.11.87
HCR 3	29.10.86	-	3.11.87
HCR 4	30.10.86	-	3.11.87
HCR 5	30.10.86	-	6.11.87
HCR 6	30.10.86	-	4.11.87

Bas Cap Rouge

BCR 5	20.11.86	-	4.11.87
BCR 6	20.11.87	-	9.11.87
BCR 8	20.11.86	-	12.11.87
BCR 9	22.11.86	-	12.11.87
BCR 12	22.11.86	-	19.11.87
BCR 13	22.11.86	-	19.11.87

Appendix 3.1 Crops cultivated by plot -- Bas Cap Rouge, 1986

BCR5 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other fall veg
1	0.040	2														x	x			
2	0.120	4	x								x					x			x	
3		1														x				
4	0.080	4	x							x						x			x	
5	0.125	2					x									x				
6	0.070	2	x																x	
7	0.080	2					x							x						
8		1																	x	
9	0.080	2			x		x													
10	0.120	2									x					x				
Total	0.715																			
Number of plots per crop			3	1	0	3	0	0	1	2	0	0	1	0	6	1	0	4	0	

BCR8 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other fall veg
1	0.220	5										x			x	x	x	x		
2	0.500	4		x		x				x						x				
3	0.180	2		x						x										
4	0.750	3								x					x	x				
5		3								x	x					x				
6	0.600	4		x		x				x	x									
7	0.320	1					x													
8	0.125	0																		
9	0.200	1														x				
10	0.250	0																		
Total	3.145																			
Number of plots per crop			0	3	0	3	0	0	5	2	1	0	0	2	5	1	1	0	0	

BCR9 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other fall veg
1	0.050	1														x				x
2	0.250	2		x												x				
3	0.125	4		x		x										x	x			
4	0.150	3	x	x		x														
5	0.125	1																x		
6	0.100	0																		x
7		3	x	x		x														
8	0.100	3		x		x										x				
9	0.250	0																		
Total	1.150																			
Number of plots per crop			2	5	0	4	0	0	0	0	0	0	0	0	4	1	0	1	0	

BCR12 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fall
1	0.375	5										X			X	X	X	X			X
2	0.200	2					X												X		X
3		1														X					X
4	0.500	5					X		X	X	X	X									X
5	0.060	4	X						X	X									X		
6		2										X				X					
7	0.600	2										X				X					
8		3					X							X		X					X
9	0.060	1			X																
Total	1.795																				
Number of plots per crop			1	0	1	3	0	2	2	1	4	0	1	1	5	1	1	2	0		

BCR13 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fall
1	0.060	3														X	X	X			
2	0.125	2		X			X														
3	0.250	4	X						X										X	X	
4		4	X						X										X	X	
5	0.125	0																			X
Total	0.560																				
Number of plots per crop			2	1	0	1	0	2	0	0	0	0	0	0	1	1	1	2	2		

BCR10 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area(Cx)	# of crops in assoc	corn	sorghum	beans	red pea	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fall
1	0.30	2								X						X					X
2	0.25	1												X							X
3	1.00	2												X		X					
4		1												X							
5		2	X															X			
6		1			X																
7	0.28	3	X							X	X										
8		2		X			X														
9		1																X			
10		1									X										
11		1														X					
12	0.25	2	X					X													
Total	2.08																				
Number of plots per crop			3	1	1	1	1	0	2	2	0	0	3	0	3	0	0	2	0		

Appendix 3.2 Crops cultivated by plot -- Haut Cap Rouge, 1986

HCR1 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg	fallow
1	0.125	3									x		x			x				
2		3	x		x							x								
3	0.25	3	x	x	x															
4		2							x		x									
5	0.08	3	x		x					x										
6	0.21	4		x		x			x	x										
7	0.18	3		x		x				x										
8	0.15	3	x				x			x										
9	0.125	3									x		x			x				
10	0.12	2							x	x										
Total	1.24																			
Number of plots per crop			4	3	3	2	0	1	3	5	3	1	2	0	0	2	0	0	0	0

HCR2 CROPS REPORTED - SECOND SEASON 1986

PLOT #	Reported AREA (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg.	fallo
1	0.136	4									x	x	x			x				x
2	0.109	1		x																
3	0.074	3							x		x	x								
4	0.245	4	x	x	x					x										
5	0.055	4	x	x	x					x										
6	0.141	3									x		x			x				
7		1		x																
8	0.126	2	x		x															
9	0.393	3				x			x	x										
10		3		x		x				x										
11		4	x	x			x			x										
12	0.512	2				x			x											
13		4	x	x	x					x										
14	0.175	2		x		x														
15		0																		x
16		1		x																
17		1																x		
18		4	x			x			x	x										
Total	1.966																			
Number of plots per crop			6	9	4	5	0	1	4	7	3	2	2	0	0	2	0	1	0	4

HCR4 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg.	fallo
1	0.210	6									x		x	x	x	x	x			
2	0.100	5	x	x	x	x				x										
3	0.070	5	x	x		x			x	x										
4		2									x		x							
5	0.125	3		x		x				x										
6	0.100	3									x	x				x				x
7	0.125	3		x		x				x										
8	0.150	3		x		x				x										
9		2					x		x											
10	0.050	4	x			x			x	x										
11		3				x			x	x										
12	0.250	3				x			x	x										
13	0.100	2							x	x										
Total	1.28																			
Number of plots per crop			3	5	1	8	1	0	6	9	3	1	2	1	1	2	1	0	0	1

HCR3 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg	fallow
1	0.25	3								x		x			x					
2	0.50	1				x														
3		4	x							x		x			x					
4		3	x	x	x															
5	0.75	4	x	x	x				x											
6		2						x		x										
7		3								x		x			x					
8	0.10	1						x												
9		4	x	x	x				x											
10	1.00	3	x				x								x					x
11	0.25	1		x																
12		3	x		x				x											
13		2								x					x					
14	0.25	2													x	x				
Total	3.10																			
Number of plots per crop			6	4	4	1	0	1	2	3	5	0	3	0	0	6	1	0	0	1

HCR5 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg	fallow
1	0.125	3									x		x			x				
2	0.09	4	x		x	x				x										
3		2									x		x							
4	0.10	2	x			x														
5																		x		
6	0.04	3	x		x	x														
7	0.17	3	x					x		x										
8	0.37	4		x		x			x	x										
9	0.25	2								x	x									
10		3		x		x			x											x
11	0.08	3	x		x	x														
12	0.03	2	x			x														
13	0.08	1									x									
14		2	x			x														
15	0.12	0																		x
16		2							x		x									
Total	1.455																			
Number of plots per crop			7	5	6	2	0	1	3	5	4	0	2	0	0	1	0	1	0	2

HCR6 CROPS REPORTED - SECOND SEASON 1986

Plot #	Reported area (cx)	# of crops in assoc	corn	sorghum	red beans	pigeon pea	other cowpea	bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	cabbage	other veg	fallow
1	0.10	3									x		x			x				
2	0.05	2									x					x				
3	0.07	2	x		x															
4	0.08	3	x		x					x										
5		2		x					x											
6	0.15	3		x		x			x											
7	0.12	4	x		x			x		x										
8	0.50	4	x		x			x		x										x
9		1														x				
10		4		x		x			x	x										
11		3		x					x	x										
12	0.05	3	x		x					x										
13	0.09	3		x		x			x											
14	0.05	4	x	x	x				x											
15	0.25	1								x										x
Total	1.51																			
Number of plots per crop			6	6	6	3	0	2	6	7	2	0	1	0	0	3	0	0	0	2

Appendix 4.1 Crops cultivated by plot - Bas Cap Rouge, 1987

3CR5 CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (Cx)	# of crops in assoc	Area per crop	corn	red sorghum	beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fallow
1	0.064	6	0.011	x				x				x	x			x		x			
2.1	0.038	2	0.019	x					x							x		x			
2.2	0.028	2	0.014							x	x										
3.1	0.147	1	0.147																		
3.2	0.008	1	0.008	x												x					
4.1	0.054	4	0.014				x		x	x											
4.2	0.073	1	0.073													x					
5	0.136	2	0.068	x						x											
6	0.080	3	0.027				x		x	x						x					
7	0.150	1	0.150																		
8	0.070	3	0.023	x				x		x				x							
12.1	0.017	1	0.017																		
12.2	0.123	3	0.041	x				x													x
13	0.033	3	0.011	x	x						x									x	
14	0.087	3	0.029	x						x	x										
15	0.084	3	0.028	x	x																
16	0.016	1	0.016													x					
Total	1.208																				x
Number of plots per crop				9	2	0	2	3	3	6	3	1	1	1	0	5	0	1	0	1	2
Potential area planted (Cx)				0.643	0.117	0	0.134	0.257	0.172	0.392	0.148	0.064	0.064	0.15	0	0.485	0	0.064	0	0.123	0.033
% total area				53.2%	9.7%	0.0%	11.1%	21.3%	14.2%	32.5%	12.3%	5.3%	5.3%	12.4%	0.0%	40.1%	0.0%	5.3%	0.0%	10.2%	2.7%
Crop area planted (Cx)				0.238	0.039	0.000	0.040	0.075	0.059	0.180	0.054	0.011	0.011	0.150	0.000	0.267	0.000	0.011	0.000	0.041	0.033
% crop area				19.7%	3.2%	0.0%	3.3%	6.2%	4.9%	14.9%	4.5%	0.9%	0.9%	12.4%	0.0%	22.1%	0.0%	0.9%	0.0%	3.4%	2.7%

PCRIA CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (Cx)	# of crops in assoc	Area per crop	corn	red sorghum	beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fallow
1	0.272	2	0.136							x						x					
2	0.235	1	0.235											x							
3	0.186	2	0.093											x		x					
4	0.242	1	0.242											x							
5	0.093	2	0.047	x		x															
6.1	0.183	1	0.183	x																	
6.2	0.072	1	0.072																		x
7	0.105	2	0.053	x				x													
8	0.049	1	0.049	x																	
9	0.009	1	0.009													x					
10	0.026	1	0.026							x											
11.1	0.099	3	0.033	x				x								x					
11.2	0.035	1	0.035													x					
11.3	0.020	1	0.020																		x
12.1	0.105	2	0.053	x				x													
12.2	0.142	1	0.142	x																	
13	0.080	1	0.080																		x
14	0.087	2	0.044	x							x										
15	0.102	1	0.102																		x
16	0.140	1	0.140																		x
Total	2.282																				
Number of plots per crop				8	0	1	0	3	0	2	1	0	0	3	0	5	0	0	0	0	5
Potential area planted (Cx)				0.863	0	0.093	0	0.309	0	0.298	0.087	0	0	0.663	0	0.601	0	0	0	0	0.414
% total area				37.8%	0.0%	4.1%	0.0%	13.5%	0.0%	13.1%	3.8%	0.0%	0.0%	29.1%	0.0%	26.3%	0.0%	0.0%	0.0%	0.0%	18.1%
Crop area planted (Cx)				0.602	0	0.047	0	0.138	0	0.162	0.044	0	0	0.57	0	0.306	0	0	0	0	0.414
% crop area				26.4%	0.0%	2.0%	0.0%	6.0%	0.0%	7.1%	1.9%	0.0%	0.0%	25.0%	0.0%	13.4%	0.0%	0.0%	0.0%	0.0%	18.1%

BCR13 CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (Cx)	# of crops in assoc	Area per crop	corn	sorghum	red beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	sugar cane	coconut	banana	citrus	fruit trees	tomato	other veg	fallow
1	0.067	1	0.067													x					
2	0.127	1	0.127	x																	
3.1	0.073	4	0.018	x			x	x		x											
3.2	0.082	2	0.041	x				x													
3.3	0.049	1	0.049																		x
4.1	0.030	1	0.030	x																	
4.2	0.059	1	0.059																		x
4.3	0.037	3	0.012	x			x			x											
Total	0.524																				
Number of plots per crop				5	0	0	2	2	0	2	0	0	0	0	0	1	0	0	0	0	2
Potential area planted (Cx)				0.349	0	0	0.11	0.155	0	0.11	0	0	0	0	0	0.067	0	0	0	0	0.108
% total area				66.6%	0.0%	0.0%	21.0%	29.6%	0.0%	21.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.8%	0.0%	0.0%	0.0%	0.0%	20.6%
Crop area planted (Cx)				0.229	0.000	0.000	0.031	0.059	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.067	0.000	0.000	0.000	0.000	0.108
% crop area				43.6%	0.0%	0.0%	5.8%	11.3%	0.0%	5.8%	0.0%	0.0%	0.0%	0.0%	0.0%	12.8%	0.0%	0.0%	0.0%	0.0%	20.6%

Appendix 4.2 Crops cultivated by plot - Haut Cap Rouge, 1987

HCR3 CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (cx)	# of crops in assoc	Area per crop	corn	red sorghum	beans	pigeon pea	other cowpea	bean	sweet manioc	potato	yam	other root	coffee	cocoa	coconu	banana	fruit trees	cabbage	other veg	fallow
1.1	0.043	3	0.014											x			x	x			
1.2	0.058	1	0.058											x							
2	0.325	5	0.065	x	x	x	x			x											
3	0.043	2	0.021											x		x	x	x			
4.1	0.038	1	0.038	x		x															
4.2	0.116	5	0.023			x															
5	0.220	5	0.044	x		x				x		x	x								
6	0.014	1	0.014																x		
7	0.161	6	0.026									x	x	x		x	x	x			
8	0.209	1	0.209																		
10	0.074	3	0.024				x			x	x										x
11	0.160	5	0.032	x	x	x	x				x										
12	0.054	2	0.027				x				x										
13	0.019	4	0.004									x		x			x	x			
19.1	0.204	1	0.204																		
19.2	0.149	5	0.029	x	x	x	x			x											x
22	0.070	1	0.070																		
Total	1.957																				x
Number of plots per crop				5	3	6	5	0	0	3	4	3	2	5	0	2	4	4	1	0	3
Potential area per crop				0.892	0.634	1.008	0.762	0	0	0.443	0.613	0.4	0.381	0.324	0	0.204	0.266	0.266	0.014	0	0.483
% total area				45.6%	32.4%	51.5%	38.9%	0.0%	0.0%	22.6%	31.3%	20.4%	19.5%	16.6%	0.0%	10.4%	13.6%	13.6%	0.7%	0.0%	24.7%
Crop area planted (Cx)				0.208	0.127	0.232	0.178	0	0	0.098	0.148	0.075	0.07	0.125	0	0.048	0.067	0.067	0.014	0	0.483
% crop area				10.6%	6.5%	11.9%	9.1%	0.0%	0.0%	..0%	7.6%	3.8%	3.6%	6.4%	0.0%	2.5%	3.4%	3.4%	0.7%	0.0%	24.7%

HCR4 CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (Cx)	# crops in assoc	Area per crop	corn	red sorghum	beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	other cabbage veg.	fallow
1	0.174	6	0.029									x		x	x	x	x	x		
2	0.102	3	0.034	x		x														
3	0.079	5	0.016	x		x					x									
4	0.032	3	0.011								x	x					x			
5	0.112	2	0.056	x		x						x		x				x		
6	0.009	4	0.002						x	x		x								
7	0.082	3	0.027	x	x						x						x			
8	0.064	6	0.011	x	x	x				x	x	x								
9																				
10	0.091	6	0.015	x	x	x	x			x	x									
11	0.081	3	0.027				x			x	x									
12	0.042	3	0.014				x			x	x									
13	0.151	1	0.151							x	x									
14	0.388	2	0.194	x	x															x
Total	1.407																			
Number of plots per crop				7	4	5	3	0	1	5	7	5	0	2	1	1	3	2	0	1
Potential area planted (Cx)				0.918	0.625	0.448	0.214	0.000	0.009	0.287	0.541	0.358	0.000	0.206	0.000	0.000	0.215	0.206	0.000	0.000	0.151
% of total area				65.2%	44.4%	31.8%	15.2%	0.0%	0.6%	20.4%	38.5%	25.4%	0.0%	14.6%	0.0%	0.0%	15.3%	14.6%	0.0%	0.0%	10.7%
Crop area planted (Cx)				0.353	0.247	0.132	0.056	0.000	0.002	0.069	0.144	0.068	0.000	0.040	0.000	0.000	0.042	0.040	0.000	0.000	0.151
% of crop area				25.1%	17.6%	9.4%	4.0%	0.0%	0.2%	4.9%	10.2%	4.9%	0.0%	2.8%	0.0%	0.0%	3.0%	2.8%	0.0%	0.0%	10.7%

HC68 CROPS OBSERVED - FIRST SEASON 1987

Plot #	Measured area (Cx)	# of crops in assoc	Area per crop	corn	red sorghum	beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	other cabbage veg.	fallow
1	0.024	4	0.006	x		x				x		x								
2	0.206	4	0.052											x		x	x	x		
3	0.027	4	0.007	x		x				x		x								
4																				
5	0.246	1	0.246																	x
6	0.202	1	0.202																	
7																				
8																				
9	0.025	4	0.006									x		x			x	x		
10																				
11																				
12	0.032	5	0.006	x		x				x		x					x			
13	0.118	2	0.059	x		x														
14	0.123	5	0.025	x	x	x	x				x									
15	0.072	5	0.014	x	x		x			x	x									
16	0.018	6	0.003	x	x	x	x			x	x									
Total	1.093																			
Number of plots per crop				7	3	6	3	0	0	5	3	4	0	2	0	1	3	2	0	0	2
Potential area planted (Cx)				0.414	0.213	0.342	0.213	0.000	0.000	0.173	0.213	0.108	0.000	0.231	0.000	0.206	0.263	0.231	0.000	0.000	0.448
% of total area				37.9%	19.5%	31.3%	19.5%	0.0%	0.0%	15.8%	19.5%	9.9%	0.0%	21.1%	0.0%	18.8%	24.1%	21.1%	0.0%	0.0%	41.0%
Crop area planted (Cx)				0.120	0.042	0.106	0.042	0.000	0.000	0.037	0.042	0.025	0.000	0.058	0.000	0.052	0.064	0.058	0.000	0.000	0.448
% of crop area				11.0%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%

HCR11 CROPS OBSERVED - FIRST SEASON 1967

Plot #	Measured area (cx)	# of crops in assoc	Area per crop (Cx)	corn	red sorghum	beans	pigeon pea	cowpea	other bean	manioc	sweet potato	yam	other root	coffee	cocoa	coconut	banana	fruit trees	other cabbage	other veg.	fallow
1	0.063	3	0.021											x			x	x			
2	0.166	1	0.166																		x
5	0.019	4	0.005							x				x	x		x				
6	0.043	2	0.022		x		x														
14	0.134	4	0.034		x		x			x											
15	0.120	4	0.030				x		x	x	x										
16	0.022	3	0.007	x		x					x										
17	0.140	6	0.023	x	x	x	x			x								x			
20	0.123	3	0.041		x					x	x										
21	0.107	1	0.107																		x
Total	0.937																				
Number of plots per crop				2	4	2	4	0	1	5	4	0	0	2	1	0	2	2	0	0	2
Potential area planted (Cx)				0.162	0.440	0.162	0.437	0.000	0.120	0.536	0.399	0.000	0.000	0.082	0.019	0.000	0.082	0.203	0.000	0.000	0.273
% of total area				17.3%	47.0%	17.3%	46.6%	0.0%	12.8%	57.2%	42.6%	0.0%	0.0%	8.8%	2.0%	0.0%	8.8%	21.7%	0.0%	0.0%	29.1%
Crop area planted (Cx)				0.031	0.119	0.031	0.108	0.000	0.030	0.133	0.112	0.000	0.000	0.026	0.005	0.000	0.026	0.044	0.000	0.000	0.273
% crop area				3.3%	12.7%	3.3%	11.6%	0.0%	3.2%	14.1%	11.9%	0.0%	0.0%	2.7%	0.5%	0.0%	2.7%	4.7%	0.0%	0.0%	29.1%