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HILLSIDE AGRICULTURE SUB-PROJECT (HASP)

Hillside Agriculture Sub-Project Baseline Survey Results

A. H. Bockarie
Jamaica, W.I.

December 1994





IICA-CI/111

ISSN/0534-5391

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MISCELLANEOUS PUBLICATION SERIES
ISSN-0534-5391
A2/JM-94/009

December 1994
Kingston, Jamaica

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Inter-American Institute for Cooperation on Agriculture."

**TECHNICAL REPORT
HILLSIDE AGRICULTURAL SUB-PROJECT (HASP)
BASELINE SURVEY RESULTS 1990**

EXECUTIVE SUMMARY

The Baseline Survey of the Hillside Agricultural Sub-Project (MINAG\IICA) describes the tree crop practices of different types of farmers in the Rio Cobre Watershed located in the Parish of St. Catherine. A stratified random sample of 273 farmers was statistically analyzed for significant trends by farm size, age, tenure, and gender in farming system, livestock and cropping patterns. Farms were divided into four classes by total farm size: 1) TINY (>0.9 ha), 2) SMALL (0.9-2.3 ha), 3) MEDIUM (2.3-4.5 ha) and 4) LARGE (>4.5 ha). A summary of the main findings of the study follows:

*** SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLE**

Farm size and fragmentation

- the average farm size was 1.7 ha and 51% of the farmers had one parcel with 34% owning two-three parcels.
- LARGE farmers had three parcels and TINY farmers had one.
- 59% of male farmers and 79% of female farmers had small and tiny farms. The mean farm size for men was 2.8 ha and women 1.7 ha. Men had more parcels (2.8) than women (1.4).

Tenure

- 57-67% of the farmers owned their land.
- the main parcel had a different tenure pattern with 87% of the farmers having land which was individually-owned or family-owned and (3%) free-use land. The other parcels had more rent and lease land (20-35%).

Age and Gender

- the average age was 54 years and did not differ by farm size or gender.
- 27% of the farmers were women.

Length of Residence and Years Off-farm

- Average length of residence was 20 years and did not differ by gender or farm size.
- 42% of farmers had never left the area.
- The average time out of the community was 27 years and ranged from 1-79 years.

*** CROPPING PATTERNS FOR DIFFERENT FARMING SYSTEMS**

- Constant cash flow (34%) and finance (22%) were the two main factors which determined land use decisions for farmers regardless of farm size, age or gender.

Major crops

- More farmers grew cocoa (83%), banana (84%), coffee (48%), citrus (49%) and other trees (38%). These crops accounted for more than 65% of the farmers' parcels.
- 20% of the farmers grew annual crops and 17% had pasture.
- 61% of the farmers had land in ruinate.
- TINY farms had more of the farm devoted to cocoa, banana, fallow, other trees, lumber, avocado and other crops.
- LARGE farms had more area in cocoa, banana, coffee, citrus, mango, pimento, lumber, other trees, pasture and ruinate.
- Male farmers had larger areas of yam and banana than female farmers.

Cropping patterns

- More TINY farmers grew cocoa (22%), and banana (23%) compared to other farm sizes with 13-16% and 11-16% respectively.
- More TINY and SMALL farmers had annuals (6%) compared to LARGE and MEDIUM with 4%.
- Fewer TINY farmers grew yams (6%), annuals (6%), coffee (4%), citrus (2%), lumber (1%), avocado (1%), and pasture (1%).
- More fallow land on the main parcel was rented (10%), leased (8%) or free (7%) than family-owned (5%) or individually-owned (3%).
- Cropping pattern did not change by gender or age on the main parcel.

Livestock

- 52% of farmers owned livestock.
- More farmers owned goats (42%) and cows (32%), however there were more chickens in the area (62%).
- Less than 1% of the farmers owned donkeys.
- SMALL farmers were more likely to have goats (54%) owned by men and chickens (12%) owned by women.
- LARGE farmers were more likely to have cows (47%).
- Farmers over 60 years owned more pigs and cows, but fewer chickens.

Farming systems

- Four farming systems were described based on the proportion of the farm in ruinate, pasture, cocoa, citrus, banana, pineapple, coffee, sugarcane and annuals.

- 31% of farmers had a mixed crop system with 65% in trees, 21% in annuals and less than 14% in fallow, pasture and ruinate.
- 25% of farmers had a cocoa and banana system with 85% in trees, 4% in annuals and less than 11% in fallow, pasture and ruinate.
- 24% of farmers had a ruinate-dominated system with 37% in trees, 6% in annuals, 7% fallow or pasture and 50% in ruinate.
- 14% of farmers had a pasture-dominated system with 40% in trees, 4% annuals, 14% fallow and ruinate and 42% pasture.

*** FARMERS' TECHNOLOGY AND CROP MANAGEMENT**

Planting

- 85% of farmers planted trees and the majority intended to expand area under tree crops in the future irrespective of age or farm size.
- Men were more likely to plant trees (93%) than women (75%).
- 66% of farmers cleared land for tree crops and 78% forked land for cash crops.
- 60% did not mould tree crops, but those who did were more likely to mould avocado, cocoa, coffee, citrus and mango.
- Less than one third used the spacing or planting depth recommended by the Ministry of Agriculture for tree crops.

Pruning

- 80% of farmers had pruned and the majority focused on cocoa and coffee. Fewer farmers pruned banana and citrus, but did so more often (3-5 times/year). Older farmers tended not to prune citrus.



Fertilizer

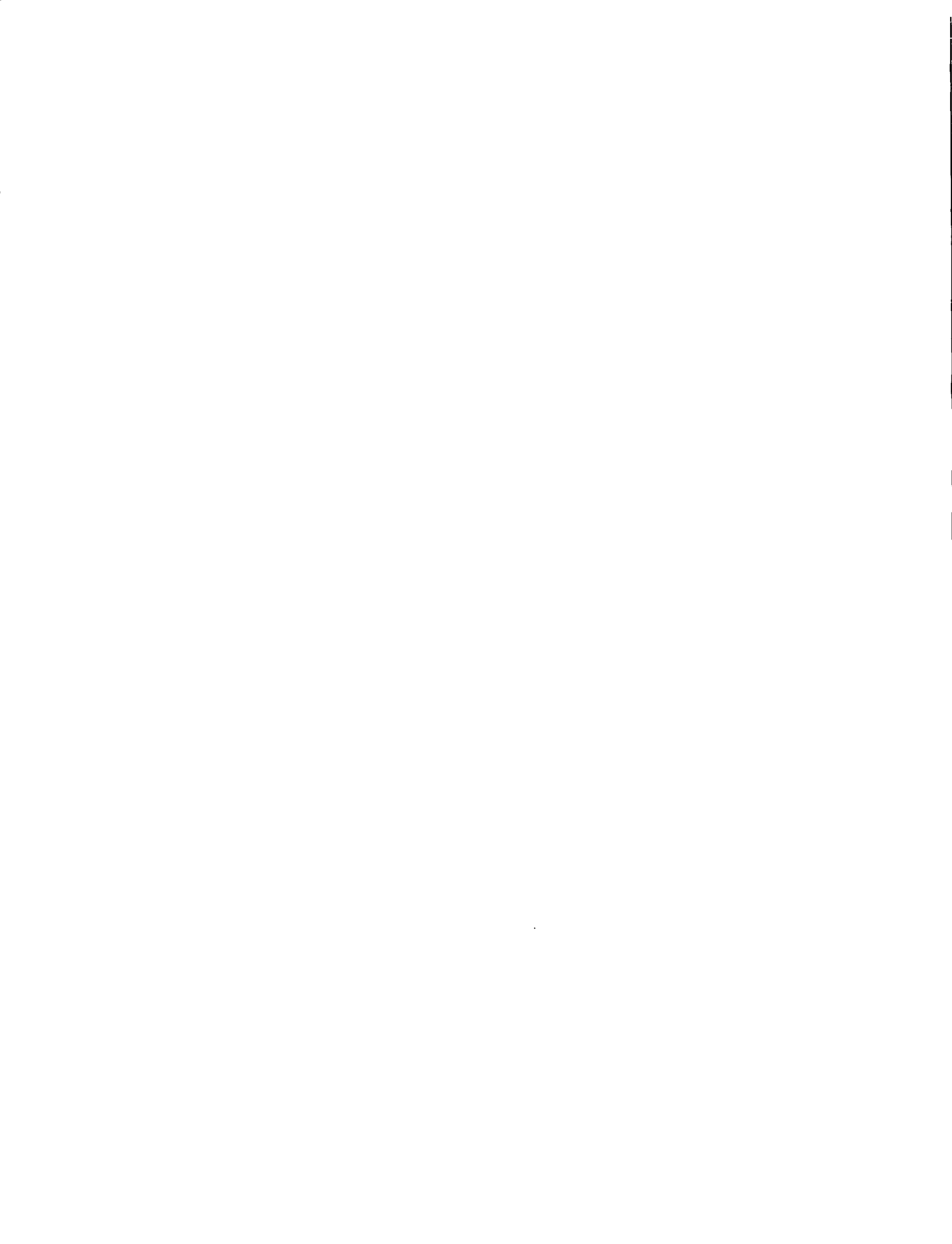
- 67% of farmers fertilized 37 different crops. Less than 50% of farmers growing cocoa, banana, coconut, citrus or plantain used fertilizer. 57% of coffee farmers fertilized the crop.
- Farmers were more likely to fertilize cocoa, coffee, citrus, coconut, plantain, banana, yam and tomato than other crops.
- Few farmers fertilized as often as recommended by the Ministry of Agriculture; 37% fertilized once per year and 36% twice per year. Women fertilized less often than men.
- Farmers under 30 years of age were more likely to fertilize banana (35%) and plantain (30%) and farmers over 60 years fertilized citrus (25%) and cocoa (33%).
- Farmers applied fertilizer by banding for citrus, coconut and tomato.

Pest management

- Less than 30% of farmers reported pest problems, with the exception of cocoa where 66% of farmers had problems with rodents and birds.
- More than 60% of farmers reporting pest problems used some method of control.
- Farmers were likely to use local methods to control slugs in banana and plantains. More information is needed to describe what farmers local methods were.

Soil erosion

- 35-65% of farmers had observed soil erosion. Gully erosion was most frequently cited.
- Larger farmers used trenching to control erosion and small farmers used no control methods



* FARMERS' ACCESS TO RESOURCES

Access to credit

- 19% of farmers had obtained a loan for farming from a Parish Council (P.C.) Bank without collateral and used it to purchase plants.
- Fewer women or small farmers secured a loan even though just as many had applied. Women were more likely to obtain credit from friends and family.

Access to labour

- 75% of farmers said labour was available, but expensive or periodic in nature irrespective of gender or farm size.
- Men hired more labourers than women and paid more per job.

Off-farm income

- A third of the farmers had access to off-farm income most of which came from wages or salaries.

Assets

- 53% of farmers had a radio as their main asset, whereas only 8% owned any means of transportation.

Market problems

- 69% of farmers listed low price, low market demand and lack of transportation as a common problem for marketing crops.
- Low price was the biggest problem for banana, plantain and tomatoes.
- Lack of transportation was an obstacle for cocoa, yams and pineapple.



* FARMERS' SOURCES OF AGRICULTURAL INFORMATION

Agricultural Information

- Radio, friends and the McDonald's Almanac were the main sources of agricultural information regardless of age, gender or farm size.

Extension Services

- 40% of farmers indicated using extension advice in the past while 88% said they hadn't received any visits or advice from an agricultural officer.
- Fewer women or small farmers used extension advice.

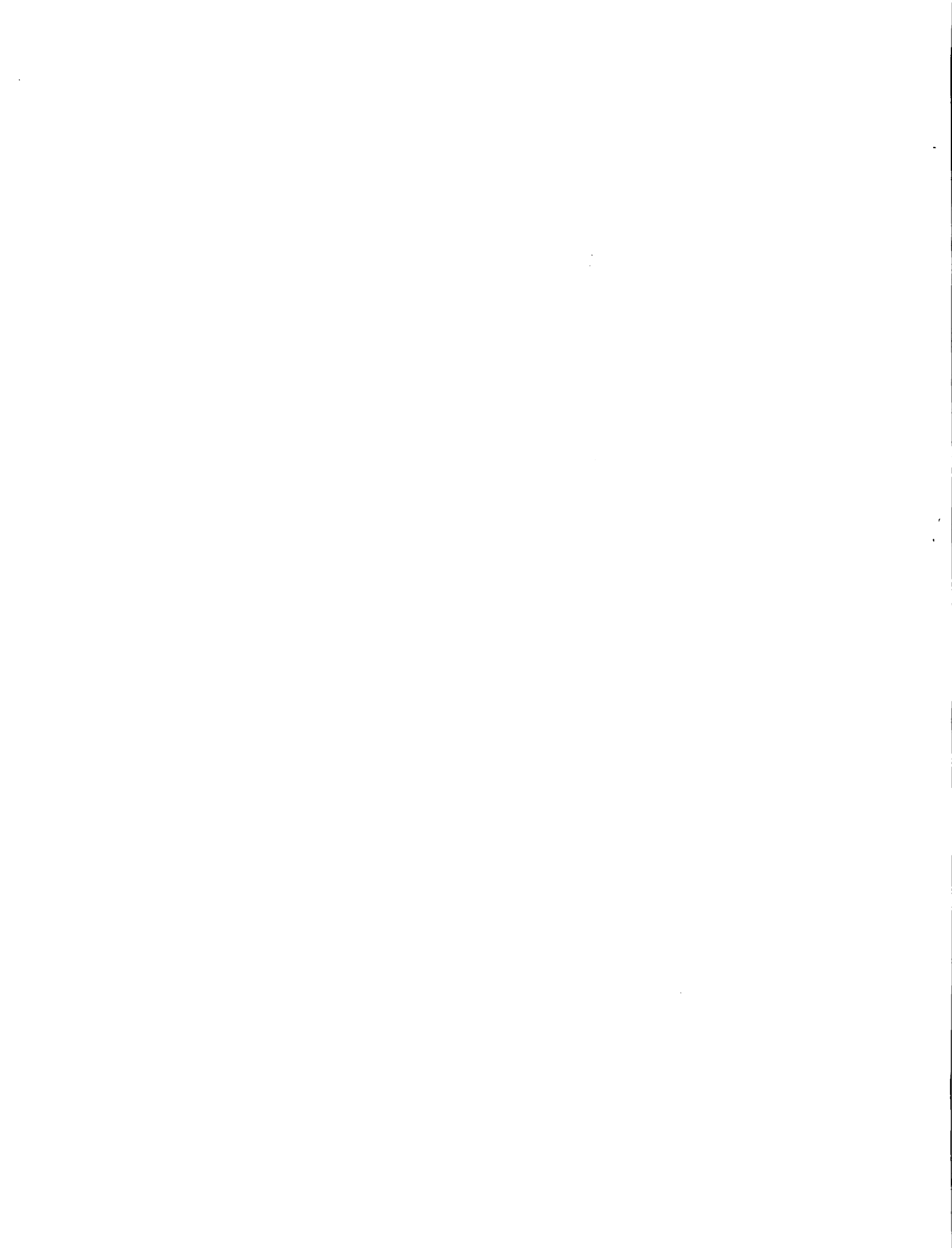
Farmers' Organizations

- 70% of the farmers were members of a farmers' organization with the Cocoa Cooperative, Coffee Cooperative and Jamaican Agricultural Society (JAS) representing 80% of them.
- 9% of farmers held an executive office in a farmers' organization.
- Women and small farmers belonged to fewer organizations. They were more likely to belong to the Cocoa Cooperative, Hillside Agriculture Sub-Project (HASP), Jamaican Livestock Association (JLA), Citrus Growers Association and the All Island Cane Growers Association (AICGA).
- Farmers under 40 years of age were more likely to belong to the Coffee Cooperative and JLA and older farmers to JAS, Citrus Growers Association and P.C. Bank.



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I. INTRODUCTION & BACKGROUND

Introduction

The Baseline Survey of the Hillside Agriculture Sub-Project (HASP) was conducted in 1990 to gather farmer information to guide project implementation and establish a benchmark of farmers' management practices for later impact evaluations of project technologies. The purpose of the survey was to highlight constraints and opportunities for improving the rural economy through the promotion of tree crop farming systems. The results provide information on the role of tree crops in the farming systems and on cultural practices and household behaviour that affect the environment.

The original objectives of the survey were:

- 1) to identify farm management practices for tree crops,
- 2) to document important socio-economic variables which characterize the farming community,
- 3) to describe farmers' perceptions of soil erosion on their farms, type of erosion observed and control methods used,
- 4) to provide an assessment of farmers' income level and expenditure.

The first three objectives are presented in this report. The fourth objective is being addressed by IICA and HASP economists in other documents.

Objectives of the Report

This report provides detailed technical information on tree crop cultivation for farming systems in the Northern Rio Cobre Watershed. Data from 273 farmers were analyzed with age, farm

size, number of parcels, tenure and gender as the main variables in relation to:

- * biophysical and socio-economic characteristics of the sample
- * cropping patterns for different farming systems
- * farmers' technology and crop management
- * farmers' access to resources
- * farmers' sources of agricultural information

The results of all statistical tests and a description of the methods used in data collection and analysis are contained in six appendices at the end of the report.

The report should serve the following functions:

* The results of the study can be used pragmatically as a basis for decision-making by the Ministry of Agriculture and other agencies for designing improved technologies and extension services to meet the specific needs of their clients.

* The study provides baseline data on cultural practices and technology needs of different types of farmers which is essential information for replication and expansion of improved technologies planned for the third phase of the Hillside Agriculture Project (HAP)

* It will broaden farming systems research and extension methodology by characterizing different hillside farming systems using a range of variables.

The Agricultural Sector

The agricultural sector constitutes the backbone of the Jamaican economy both for domestic food consumption and export income. Sugarcane and banana contributed 78% of the foreign exchange earnings for the agricultural sector in 1991 (Planning Institute of Jamaica, 1991). Cocoa, coffee, citrus, coconut,

pimento and other tree crops have traditionally been important agricultural exports. Although Jamaica is not one of the largest producers of cocoa on the international market, cocoa is the nation's fourth largest export crop earning US\$7.1 million in foreign exchange in 1987 (Jamaican Planning Institute, 1987).

In 1990, the Jamaican population was estimated to be 48% rural (Statistical Institute of Jamaica-STATIN, 1990). More than 80% of farms are owned by smallholders with parcels averaging less than 2 ha per farm. Small farmers make important contributions to the agricultural sector. For example, they produced 76% of the leading export crop, sugarcane, (IICA, 1989) and accounted for over 75% of the country's total cocoa production (Fagan, 1984). In addition to export earnings, small farmers comprise the bulk of domestic food producers with 74.2% owning farms under 11 ha.

Jamaica's economy suffered a setback in the agricultural, manufacturing and tourism sectors from the \$500 million in property damage caused by Hurricane Gilbert in late 1988 (STATIN, 1989). Small hillside farmers were particularly effected by Gilbert due to crop damage and losses caused by high winds, land slides and associated flooding.

Since 1983, the country has been in the process of economic structural adjustment. The move to a market driven economy has had a negative impact on income distribution and the rural poor, including small farmers (Bullock, 1993). Farmers cited crop losses due to disease, marketing problems and credit as the major constraints to increasing agricultural production. Both men and women placed money and employment as the biggest obstacles in their lives (Harris, 1985).

The HAP baseline survey indicated that 19% of farmers in the project area were women (HAP, 1990). Women farmers tend to be concentrated on microplots meaning that 90% farm areas that are less than 2 ha (IICA/MINAG, 1990). It has been estimated that married women pay for 63% of the household expenses and single

women for 80% (Bolles, 1983). Food, clothing, school fees, medical services and taxes are a few examples of the items a woman's income purchases for the family (Chaney, 1983). Poor women who earn less than J\$400/week struggle to feed their families. The weekly cost of food for a family of five rose from J\$24 in 1979 to J\$128 in 1985 (Davies and Anderson, 1987). Informal marketing or "higglering" of produce is one of the common means by which women supplement their income and accounted for 80% of the distribution of all small farm produce (Lewars, 1981). Women's active contribution to the agricultural sector and rural farm family must be considered in technology development.

Several evaluations of agricultural development projects in Jamaica have shown that when projects end, farmers do not continue to use the introduced technologies (Harris, 1985; Loudon, 1988; Armstrong et. al., 1986). Studies have shown that sustainable benefits can be realized by emphasizing a farmer-oriented approach which includes:

- 1) a thorough analysis of constraints and development potentials of the farming system (Rocheleau, 1987),
- 2) the participation of farmers in all phases of the project including planning and evaluation (Ortiz, 1989),
- 3) the development of community organizations for getting needed inputs and marketing products (Hoskins, 1987) and
- 4) linking these newly-formed community groups with established institutions such as commodity boards (Uphoff, 1986).

The Hillside Agriculture Project Strategy

The Hillside Agricultural Project (HAP) initiated by the Government of Jamaica and USAID is addressing the problems of soil erosion and the decreased agricultural productivity on steep lands

by promoting community projects which contain (HAP, 1986):

- * perennial cropping,
- * improved technologies and
- * community participation

The objective of the project is to alleviate the degradation of the hillside environment by fostering sustainable land-use practices.

HAP has incorporated a farmer-orientated approach by organizing active farmer participation in all sub-project activities (Koehn et. al., 1989) Each subproject within HAP has developed its own extension strategy to involve farmers directly in technology transfer. However only the HASP attempts to generate new technology for farmers.

Hillside Agricultural Sub-Project

The Hillside Agriculture Sub-Project (HASP) is implemented by MINAG R&D and IICA. Its broad objective is to develop tree-based production systems which contribute to increased incomes for small hillside farmers while protecting watershed resources. It began in 1989 and is in its final year; its area of operation is northeastern St. Catherine.

The HASP project approach can be described as an "Integrated Farming Systems Research and Extension" methodology. The HASP, working through a multi-disciplinary team, includes on-farm adaptive research for tree crops and companion/inter-crops; extension of tree-based and resource conservation technologies; farmer organization and participation through Farmer Action Committee Teams (FACTS); an economic component that includes cost-benefit evaluation of on-farm trials; a plant protection component; a Market Fair; and a pilot input supply (farm store) and credit program.

II. DESCRIPTION OF THE SURVEY AREA

Biophysical Characteristics

The HASP project is located in the northeastern section of the Rio Cobre Watershed in the Parish of St. Catherine. Mean daily temperature at Riversdale ranged from a low of 23°C from January through April to a high of 26°C in July and August (National Meteorological Service, 1989). Annual rainfall is 1984 mm with peaks during May-June and Sept.-Nov. Slopes range from 0-50% with 80% of the land falling between 2-30% (Campbell, 1993). Union Hill-Rock Outcrop Complex and Flint River Sandy Loam account for 63% of the soils in the area (Rural Physical Planning Division, 1988).

Socio-economic Characteristics

Farm size, Tenure and Fragmentation

Farms were divided into four classes by total farm size as shown in Table 1. The median farm size was 1.7 ha with a range from 0.09 to 27.3 ha. There was no significant difference in the age of farmers in any farm size class. Women had proportionally fewer farms in the large and medium classes ($p = 0.004$). In addition, women had less total acreage on their farms (mean = 1.7 ha, SE 0.29) compared to men (mean = 2.8 ha, SE 0.24).

TABLE 1: AGE, GENDER AND PERCENTAGE OF FARMERS IN THE FOUR FARM SIZE CLASSES IN THE SAMPLE (N = 273)

CLASS	TOTAL FARM SIZE (ha)	TOTAL FARM SIZE original in ac	% FARMERS IN CLASS	MEAN AGE	MALE %	FEMALE %
TINY	0 < 0.9	0 < 2	23	55	30	40
SMALL	0.9 < 2.3	2 < 5	32	53	29	39
MEDIUM	2.3 < 4.5	5 < 10	22	58	24	18
LARGE	> 4.5	> 10	13	51	17	3
	Missing values		10	0	0	0
	TOTALS		100	54	100	100

Data on tenure were obtained from the Farmers Register using 850 farmer records and 1,233 parcels. Between 57-67% of the farmers owned their land regardless of whether it was the main or fifth parcel (Figure 1). The overall tenure pattern for the main parcel (1) was significantly different than for parcels 2, 3, 4, and 5 ($p = 0.02$). Farmers had a greater proportion of owned and family land (87%) and less leased and rented land on the main parcel. It is important to note that (3%) of the farmers ($N=24$) had access to free use land on their main and second parcels. The information for parcel 5 should be treated with caution because tenure data were available for only seven farmers.

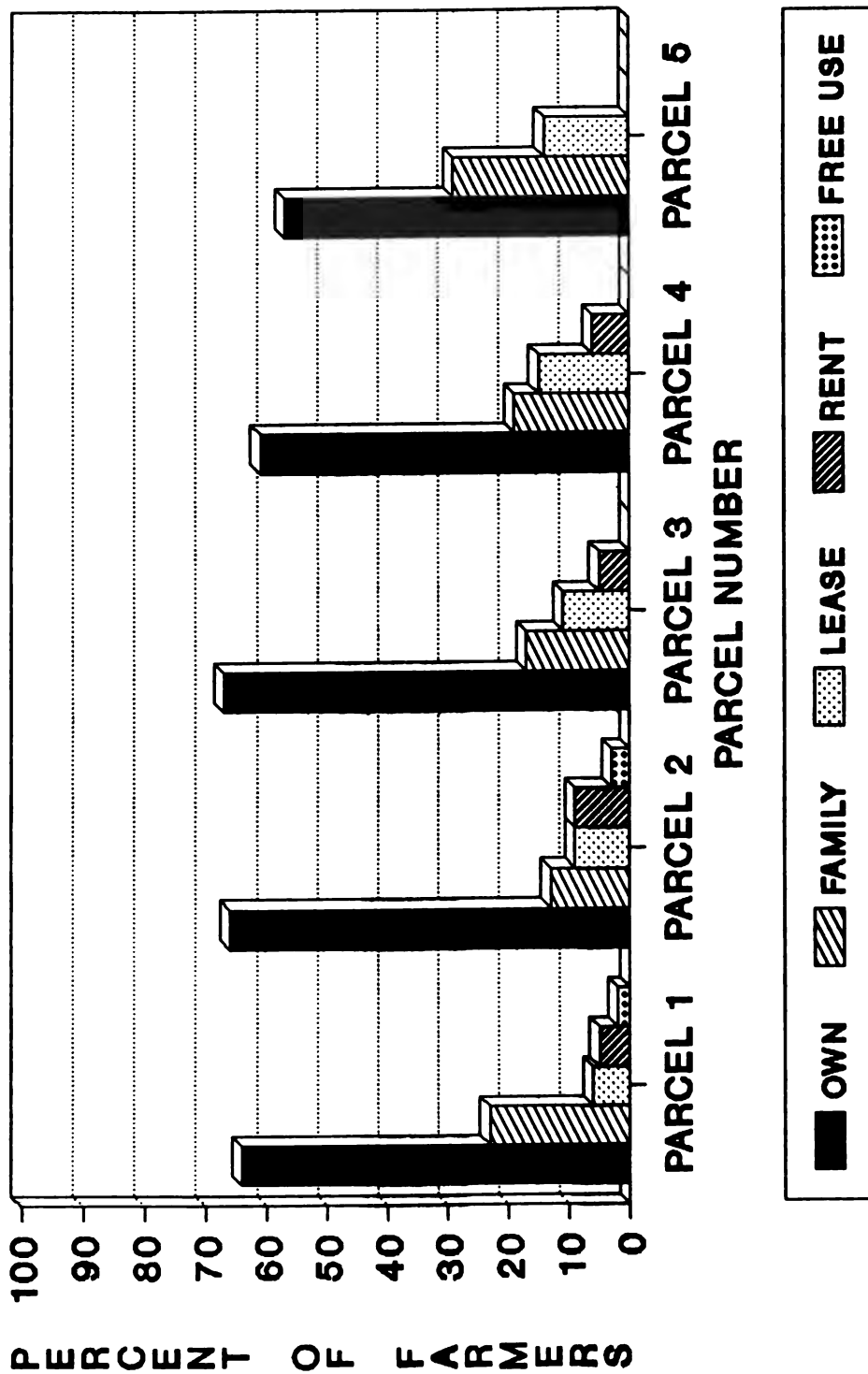
Information on number of parcels farmed was obtained by matching records of farmers from the Baseline Survey and Farmers' Register. For a complete description of both surveys see Appendices I, II and III. The 247 farmers with matching records farmed 400 parcels. Half of the farmers farmed one parcel and 34% farmed two-three parcels (Table 2).

TABLE 2: FREQUENCY DISTRIBUTION FOR NUMBER OF PARCELS PER FARMER

NO. OF PARCELS	FREQUENCY	PERCENT
1	140	51
2	51	19
3	40	15
4	12	4
5	4	2
Missing values	26	10
TOTALS	273	100

LARGE farms had significantly more parcels (mean = 2.8 parcels) compared to MEDIUM (1.9), SMALL (1.6) and TINY farms (1.2) ($p < 0.001$). Women had fewer parcels (mean 1.4 parcels, SE 0.08) than men (mean = 1.9 parcels, SE 0.08).

FIGURE 1: PERCENTAGE OF FARMERS WITH PARCELS IN DIFFERENT TENURE CLASSES



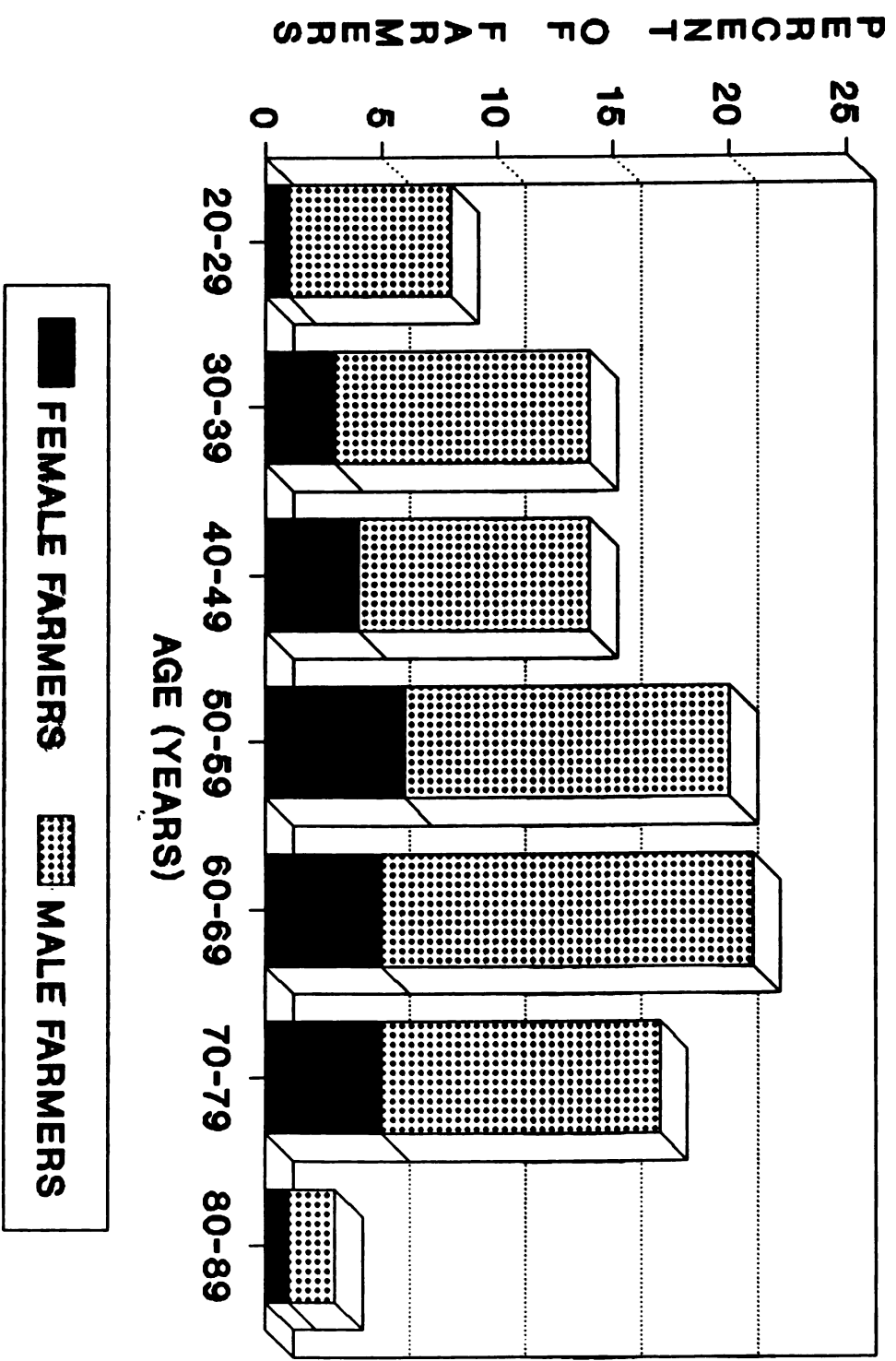
Age and Gender

The percentage of female farmers (27%) was substantially higher than for other studies (12%, STATIN, 1989 or 19%, HAP, 1990). There was no statistical difference in the mean age of male (54 years) and female farmers (57 years) and the distribution of the ages was similar by gender (Figure 2).

Length of Residence and Years Off-Farm

The median length of residence was 20 years with a range of 1 to 85 years. There was no gender or farm size difference in length of residence. The number of years the farmer had lived off the farm was calculated by subtracting the farmer's age from his length of residence. Forty-two percent had never left, of the remainder the median time out of the community was 27 years with a range from 1-79 years.

FIGURE 2: AGE AND GENDER COMPOSITION OF FARMERS IN THE BASELINE SAMPLE



III. DESCRIPTION OF CROPPING PATTERNS

Land Utilization Patterns

Constant cash flow (34%) and finance (22%) were the two main factors which determined land use decisions. There was no significant difference in response by farm size (Figure 3), age or gender. Knowledge of the crop, labour requirement and market price were the primary factors in land-use decisions for 10% of the farmers respectively.

Major Crops

The average area farmed for each crop was calculated for 232 farmers from the Farmers' Register. Crop information related to 604 ha. Cocoa, banana, coffee, citrus and other tree crops were grown by the largest percentage of farmers (Table 3). Farmers devoted more parcels to these crops. Sixty-one percent of farmers had rinate land which was the third most frequently listed component on a given parcel. The median parcel size for each crop was computed because the mean did not reflect the average size due to large farms inflating the value. The median is a better average for crop parcel size where there is a large discrepancy between the minimum and maximum values.

The proportion of land devoted to a single crop in relation to all land under cultivation was calculated for each crop and analyzed by farm size and gender using analysis of variance. This analysis looked at the predominance of a crop on a farm not the overall cropping pattern for that farm.

The proportion of the farm cultivated did not differ by farm size for: coffee (10-26%), citrus (10-18%), coconut (4-13%), mango (6-12%), pimento (6-17%), sugarcane (7-15%), pineapple (5-50%) and rinate (27-50%). TINY farms when compared to the other sizes had a significantly greater proportion of the farm devoted to: cocoa (55%), banana (24%), fallow (33%), yam (21%), other trees (20%), lumber (15%), avocado (10%) and other crops (15%) (Figure 4).

FIGURE 3: FACTORS DETERMINING LANDUSE BY FARMSIZE (N=271)

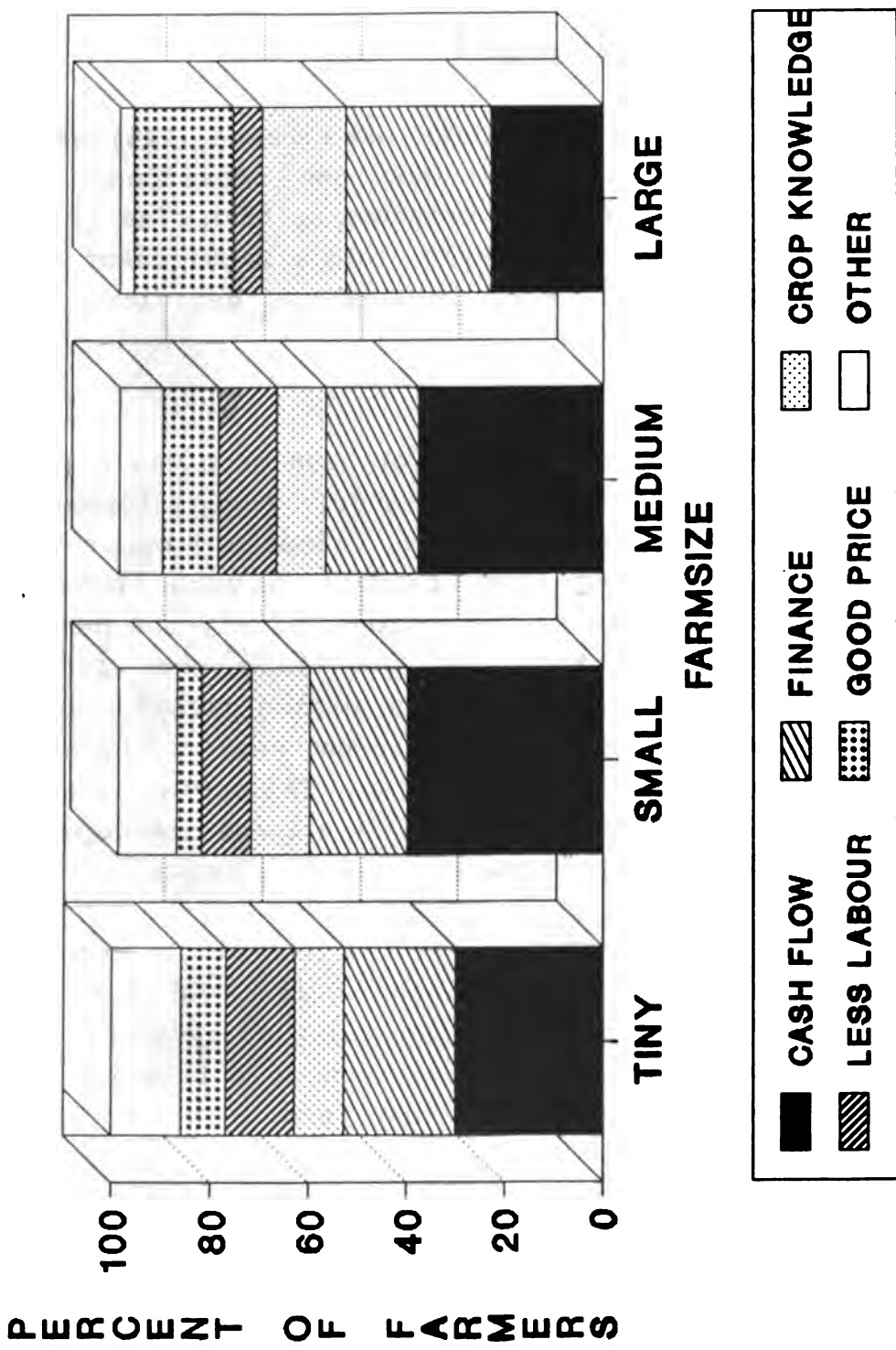
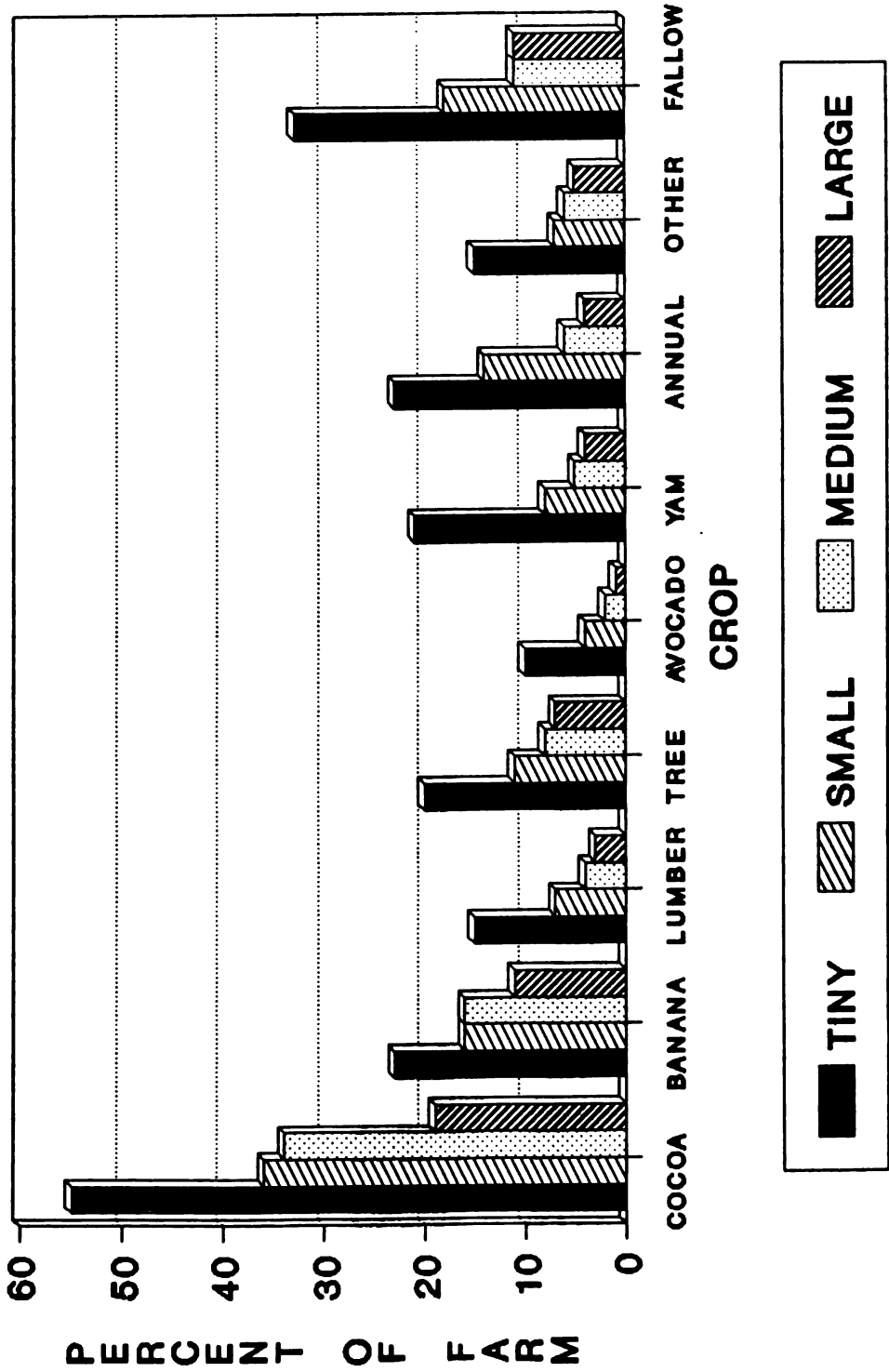


TABLE 3: AVERAGE PARCEL SIZE PER CROP

CROP	MEAN (ha)	MEDIAN (ha)	NUMBER OF PARCELS	PERCENT OF FARMERS	MINIMUM SIZE	MAXIMUM SIZE
BANANA	0.25	0.14	262	84	0.02	1.8
COCOA	0.55	0.23	254	83	0.02	6.8
COFFEE	0.23	0.09	140	48	0.01	2.3
CITRUS	0.29	0.09	129	49	0.01	3.6
OTHER TREES	0.15	0.09	119	38	0.02	1.4
MANGO	0.16	0.05	83	29	0.01	2.7
PIMENTO	0.23	0.09	76	25	0.02	2.3
AVOCADO	0.06	0.05	38	15	0.01	0.5
LUMBER	0.11	0.05	47	19	0.01	0.7
OTHER CROP	0.16	0.09	71	25	0.02	3.2
SUGARCANE	0.25	0.09	62	23	0.02	2.3
YAM	0.13	0.09	73	28	0.01	0.9
PINEAPPLE	0.18	0.09	39	13	0.02	0.7
ANNUALS	0.16	0.09	66	25	0.01	1.4
FALLOW	0.38	0.23	68	26	0.02	5.0
PASTURE	1.00	0.45	42	17	0.05	4.5
COCONUT	0.20	0.14	9	3	0.05	0.5
RUINATE	0.73	0.45	176	61	0.05	20.5

FIGURE 4: PROPORTION OF THE TOTAL FARM CULTIVATED IN EACH CROP BY FARM SIZE



The differences between the SMALL, MEDIUM, and LARGE farm sizes for these crops were not significant. The proportion of annual crops was an exception in that there was no significant difference between TINY and SMALL farms.

The mean number of hectares per farmer of each crop was used to assess differences by farm size in the total amount of that crop grown. LARGE farms had significantly more land devoted to: cocoa, coffee, citrus, mango, pimento, lumber, other trees, banana, pasture and ruiate (Figure 5). TINY, SMALL and MEDIUM farms were similar in the amount of each crop except for cocoa, coffee, lumber and banana. The amount of cocoa cultivated decreased by farm size ($p = 0.001$). Coffee also decreased by farm size ($p = 0.002$), however TINY and SMALL farms did not differ. The amount of lumber and banana grown did not differ between MEDIUM and LARGE farms.

There were significant differences by gender in the mean area for two crops ($p = 0.001$). Male farmers cultivated twice as large an area in yam and bananas than female farmers.

Cropping Pattern

Cropping patterns were compared for 850 farms from the Farmers Register by farm size, tenure, gender and age using the total number of farmers growing the crop. Seventeen crops were included in the analysis. Crop patterns were divided into two groups: 1) the mix of crops that were statistically different across the four variables and 2) the mix which was not. To separate crops into the groups, crops were systematically eliminated from the analysis until there were no statistical differences using Pearson's Chi squared test.

Farm size

Figures 6A-D illustrate the mix of nine crops which had significant differences in the percentage of farmers growing them by farm size. The differences arise because TINY farms had a greater proportion of farmers growing cocoa and bananas and fewer farmers growing other crops in comparison to SMALL, MEDIUM and LARGE farms. Figure 7 shows the crops which were similar.

**FIGURE 5: MEAN CROP AREA CULTIVATED
BY FARMSIZE**

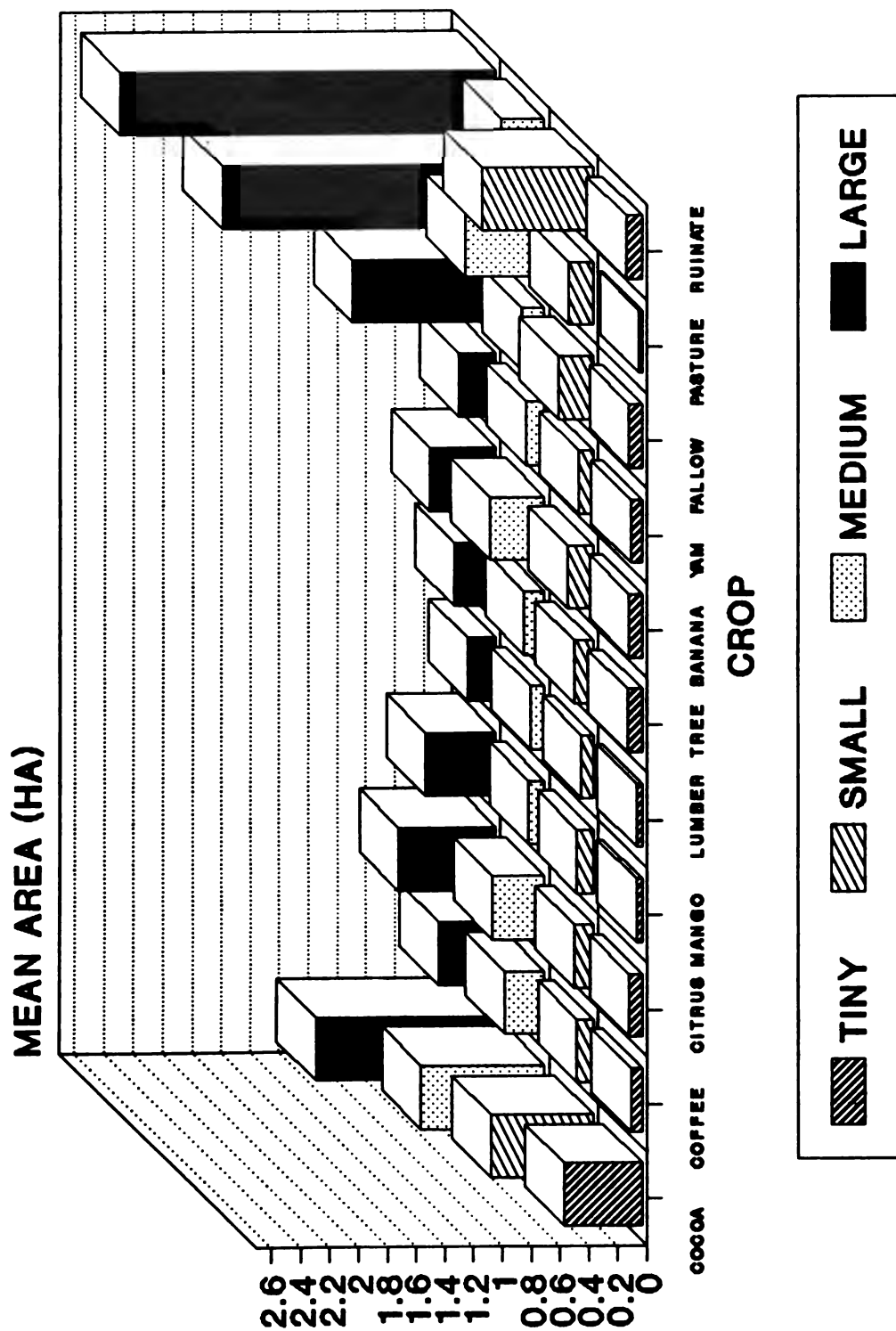
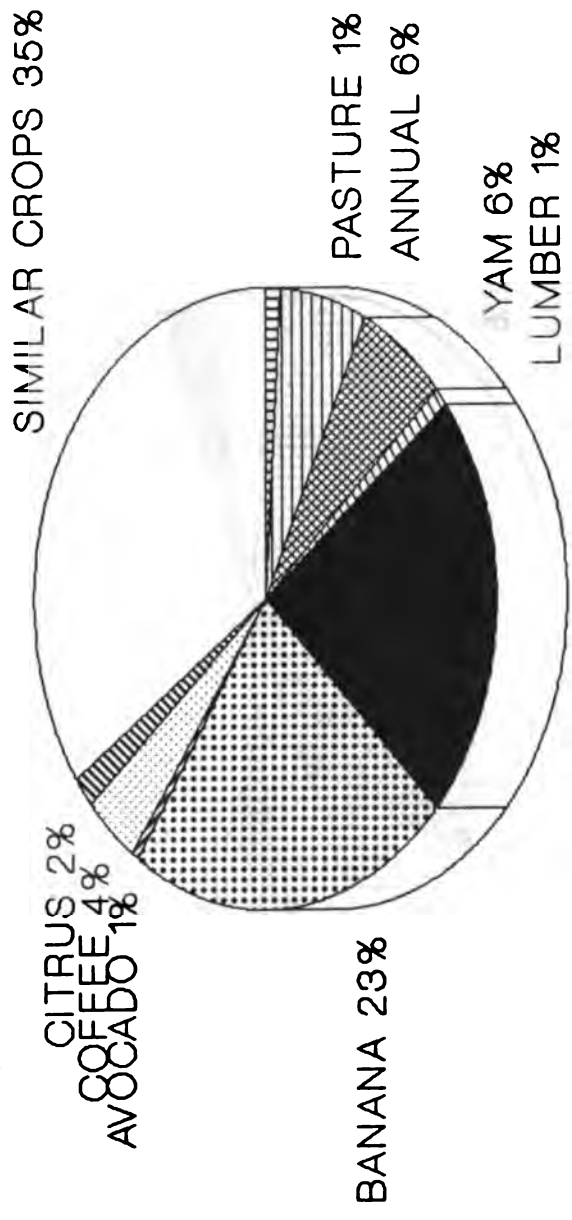


FIGURE 6A: CROPPING PATTERN DIFFERENCES FOR PERCENT OF FARMERS GROWING THE CROP



TINY FARMS

FIGURE 6B: CROPPING PATTERN DIFFERENCES FOR PERCENT OF FARMERS GROWING THE CROP

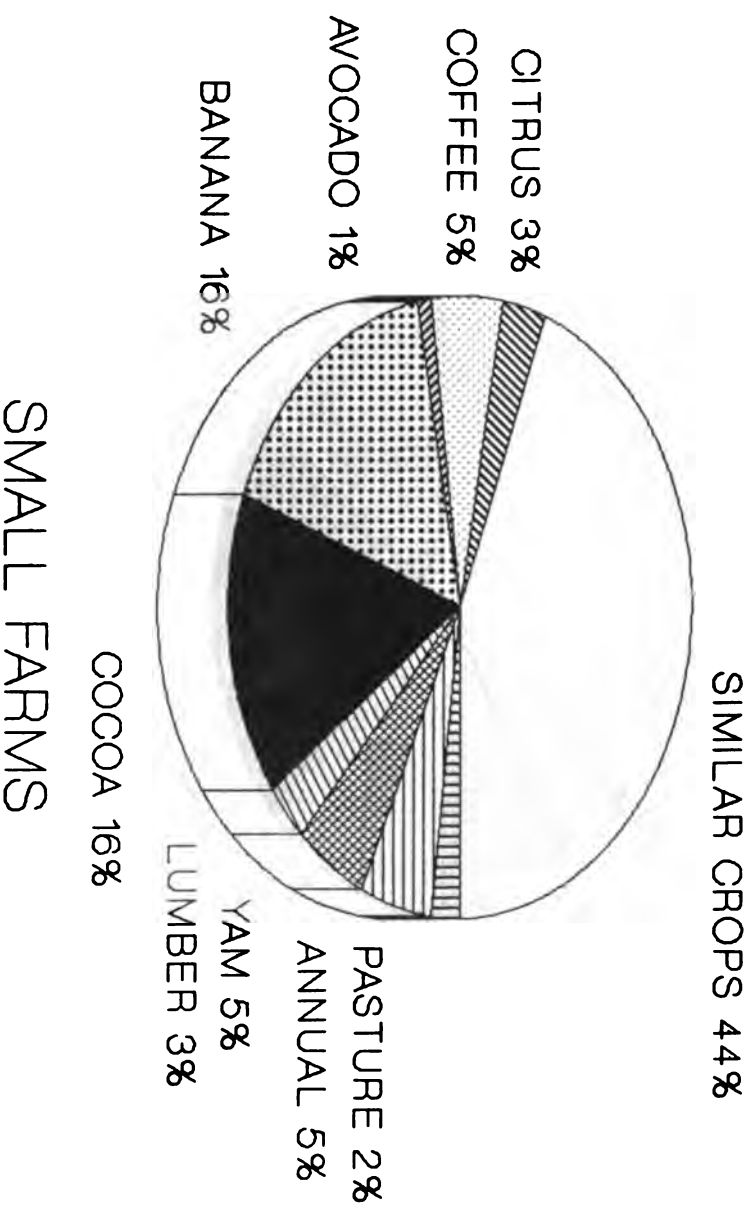


FIGURE 6C: CROPPING PATTERN DIFFERENCES FOR PERCENT OF FARMERS GROWING THE CROP

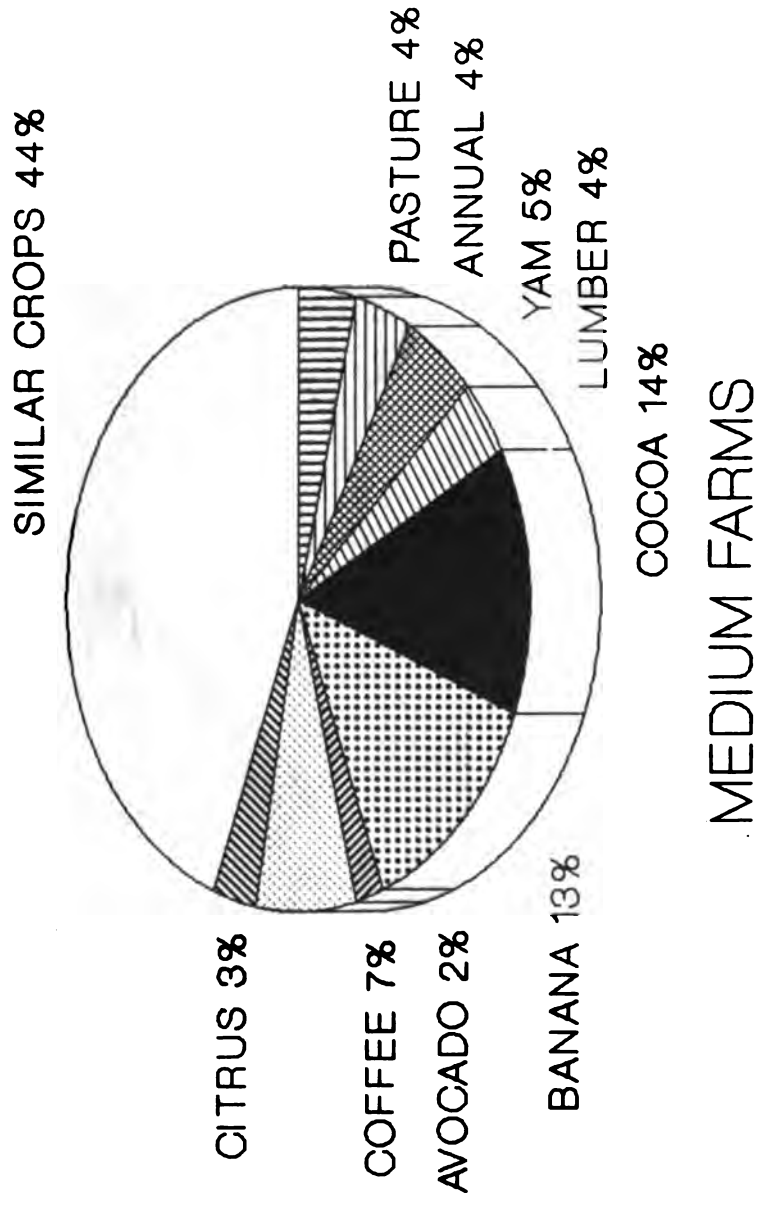


FIGURE 6D: CROPPING PATTERN DIFFERENCES FOR PERCENT OF FARMERS GROWING THE CROP

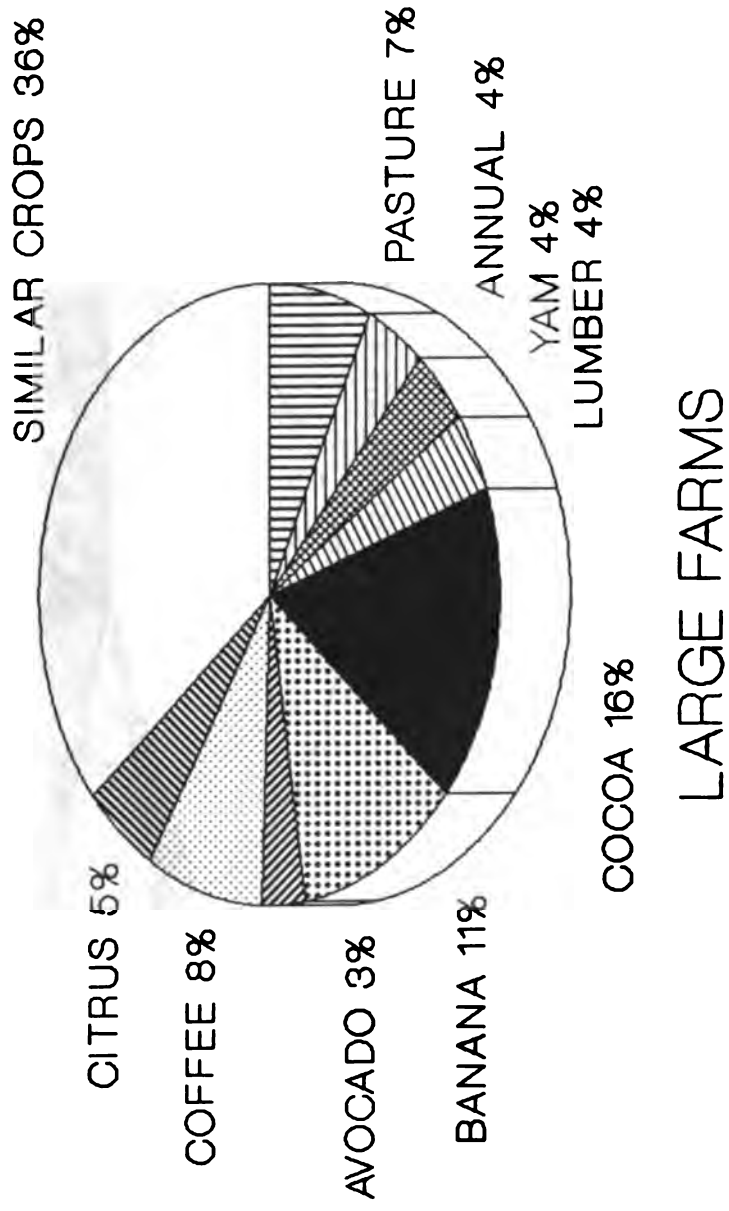
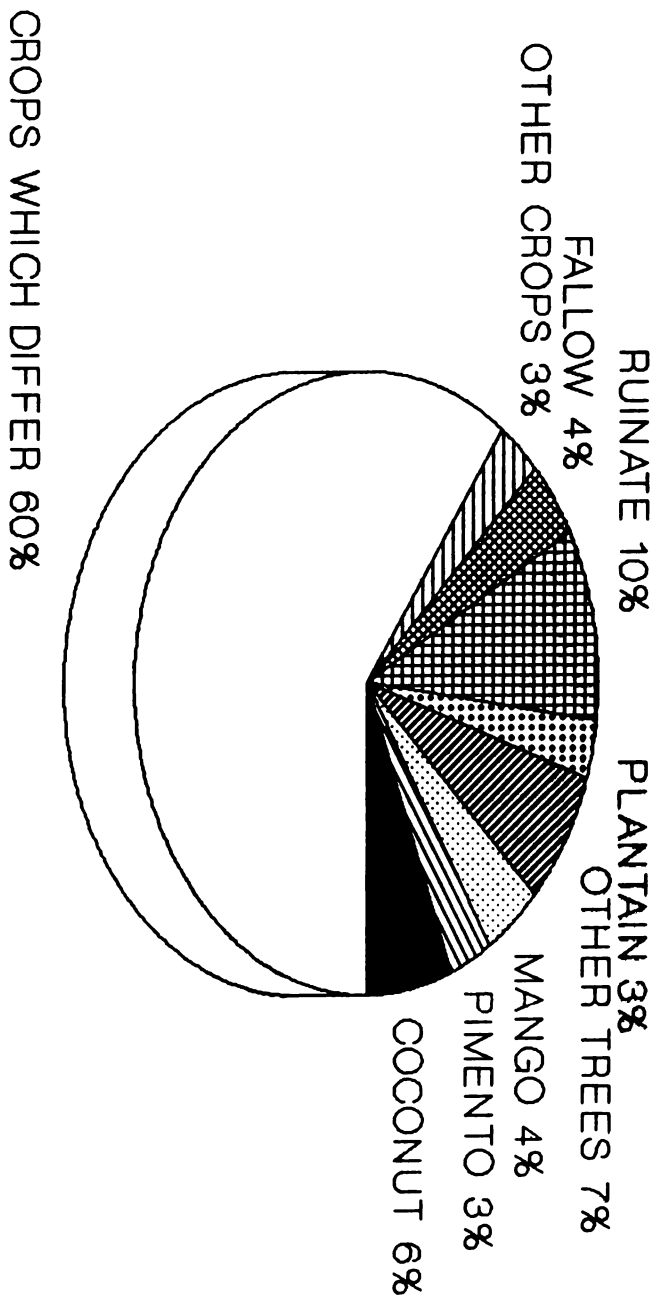


FIGURE 7: PERCENT OF CROPS WHICH ARE SIMILAR ACROSS ALL FARM SIZES



Tenure

Cropping patterns differed by tenure for the main and second parcel ($p = 0.003$). When fallow land was removed from the crop mix, the differences were no longer significant. For both parcels, the proportion of farmers with fallow land in rent (9.9%), free (6.7%) and lease (8%) was higher than family (5%) and owned (3%). In contrast, cropping patterns did not change for the third, fourth and fifth parcels based on farmers' tenure.

Gender

Cropping patterns were similar irrespective of gender for different farm sizes.

Age

Changes in cropping patterns by age were compared using a subsample of farmers from the Farmers Register. Two separate analysis were performed using the farmer's main parcel. The first analysis used data from 142 farmers who had a farm size of between 0.5-0.9 ha. The farmers were divided into two groups: 1) younger farmers less than 40 years of age ($n= 71$) and 2) older farmers more than 60 years of age ($n= 71$). The median areas for 18 different crops were ranked and the rank order was compared using Spearman's Rank-Order Correlation Coefficient. The second analysis used data from 83 farmers who had a farm size greater than 2.3 ha. Farmers were divided into the same two age groups and ranked median areas for the crops were compared.

The rank correlation between younger and older farmers for the 0.5-0.9 ha farm size was 0.65 and for the 2.3 ha farm size was 0.72. The overall rank correlation between the 0.5-0.9 ha and the 2.3 ha farm sizes was 0.72. All rank correlations were significant at $p = 0.01$. The results indicate that a similar cropping pattern existed on the main parcel for the farms irrespective of farm size and age.

Livestock

Information on livestock was obtained from 850 farms in the Farmers Register (Table 4). Fifty-two percent of farmers owned

livestock (n = 441). Farmers were more likely to own goats (42%) and cows (32%), however in total numbers there were more chickens found in the area than any other type of livestock (62%). Less than 1% of the farmers owned donkeys.

TABLE 4: TOTAL LIVESTOCK OWNED BY FARMERS

ANIMALS	LIVESTOCK			FARMERS	
	HEADS	PERCENT	MEAN	NUMBER	PERCENT
Chickens	4012	62	98	41	9
Goats	1114	17	6	187	42
Cows	969	15	7	139	32
Pigs	377	6	5	71	16
Donkeys	14	>1	5	3	>1
TOTALS	6486	100	-	441	100

The pattern of livestock ownership was analyzed by farm size, age and gender using both the total number of livestock and the total number of farmers owning livestock.

Farm size

Livestock ownership patterns differed by farm size for both number of farmers owning livestock and the total number of livestock owned ($p = 0.009$). Proportionally more TINY farmers (54%) owned goats and more LARGE farmers (47%) owned cows (Figure 8). The proportion of farmers owning chickens decreased as farm size increased. Conversely, the proportion of farmers owning cows increased with farm size. There were more chickens (60-76%) found on TINY, SMALL and MEDIUM farms than on LARGE farms (21%) (Figure 9). LARGE farms had proportionally more goats (42%).

Gender

The total number of livestock owned was significantly affected by farm size and gender ($p < .0001$) (Figure 10). For both TINY and SMALL farms, men had more cows (7-41%), goats (12-15%) and pigs (4-6%) compared to women with more chickens (89-91%). On MEDIUM

FIGURE 8: NUMBER OF FARMERS OWNING LIVESTOCK BY FARM SIZE

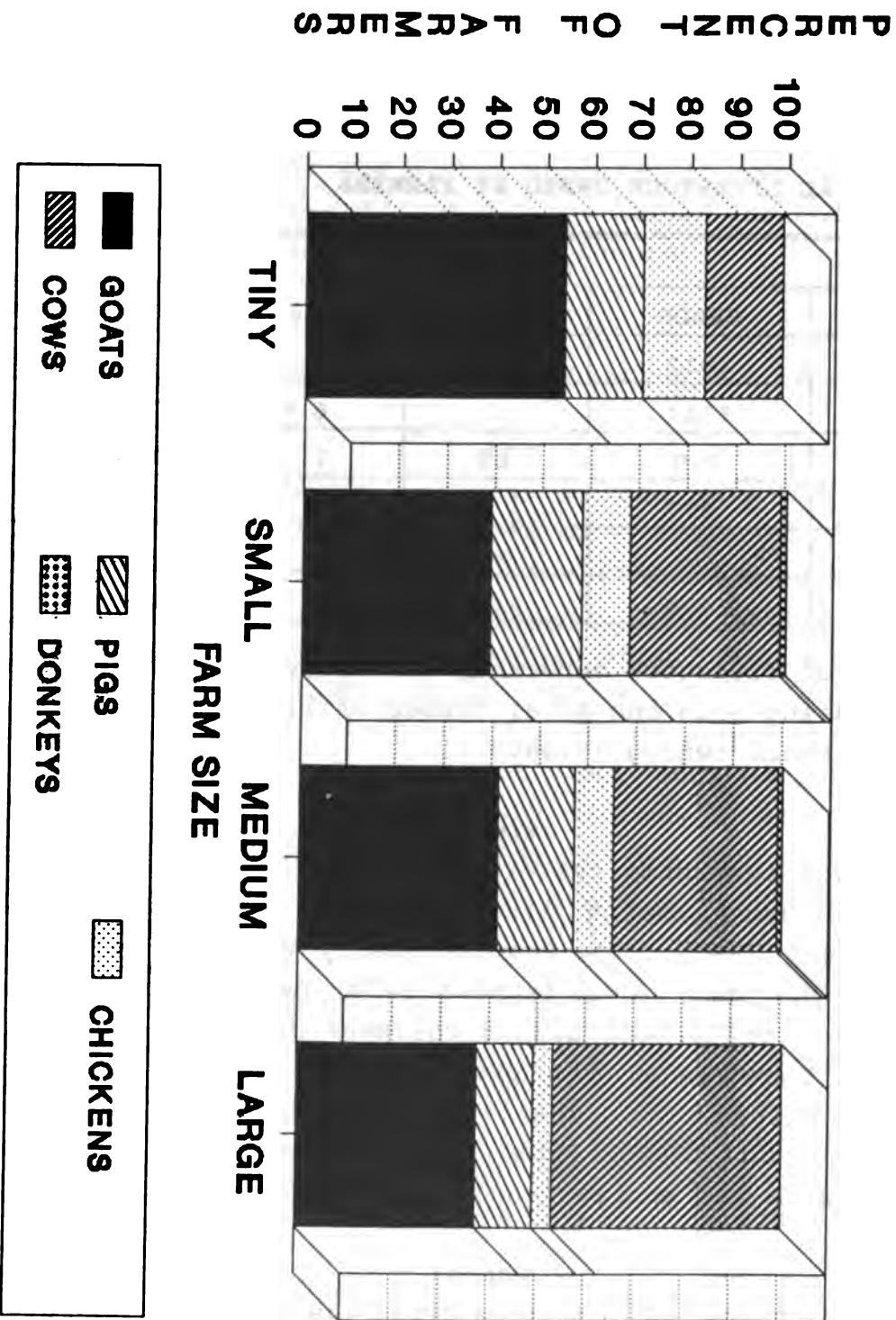


FIGURE 9: NUMBER OF LIVESTOCK OWNED BY FARM SIZE

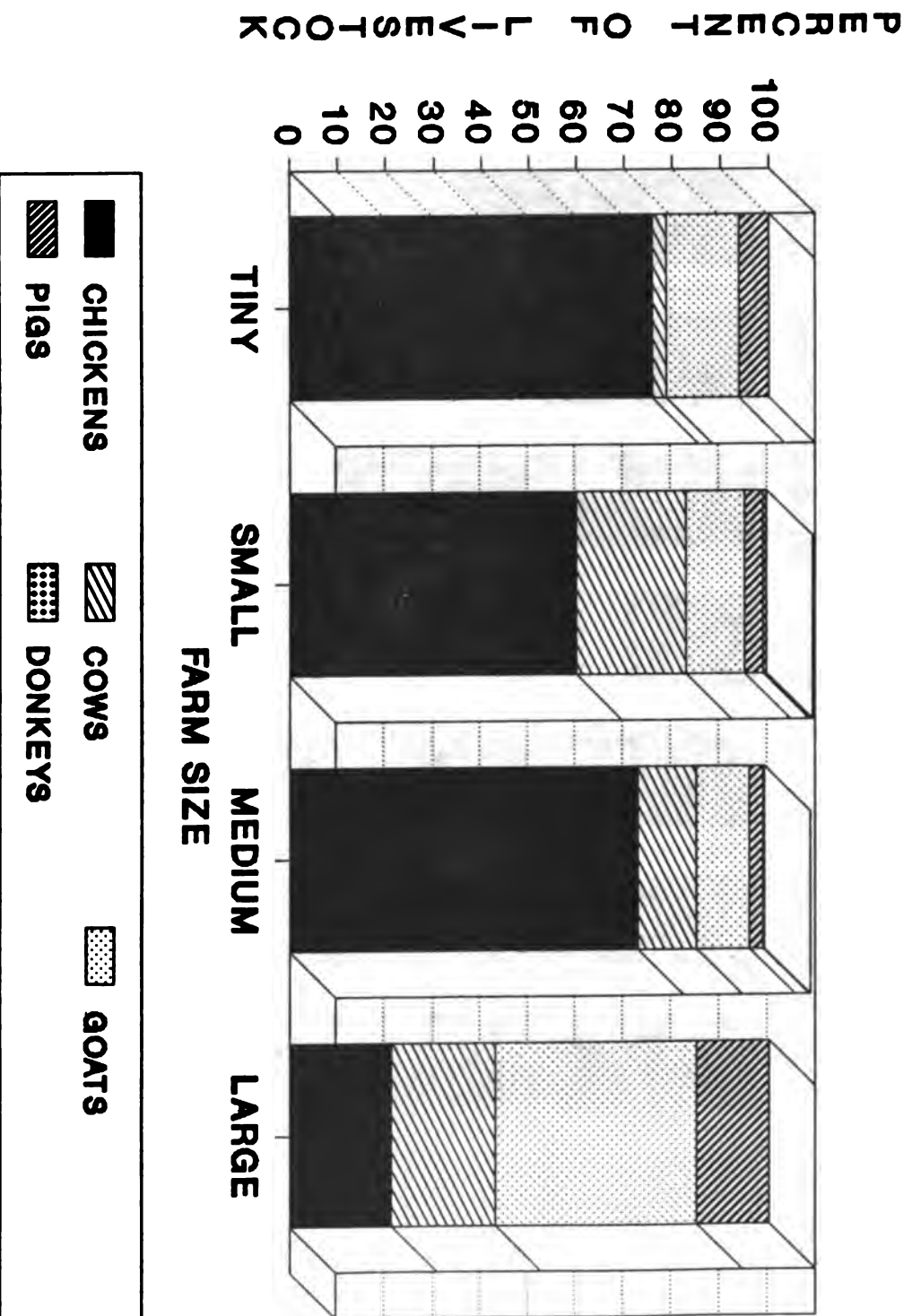
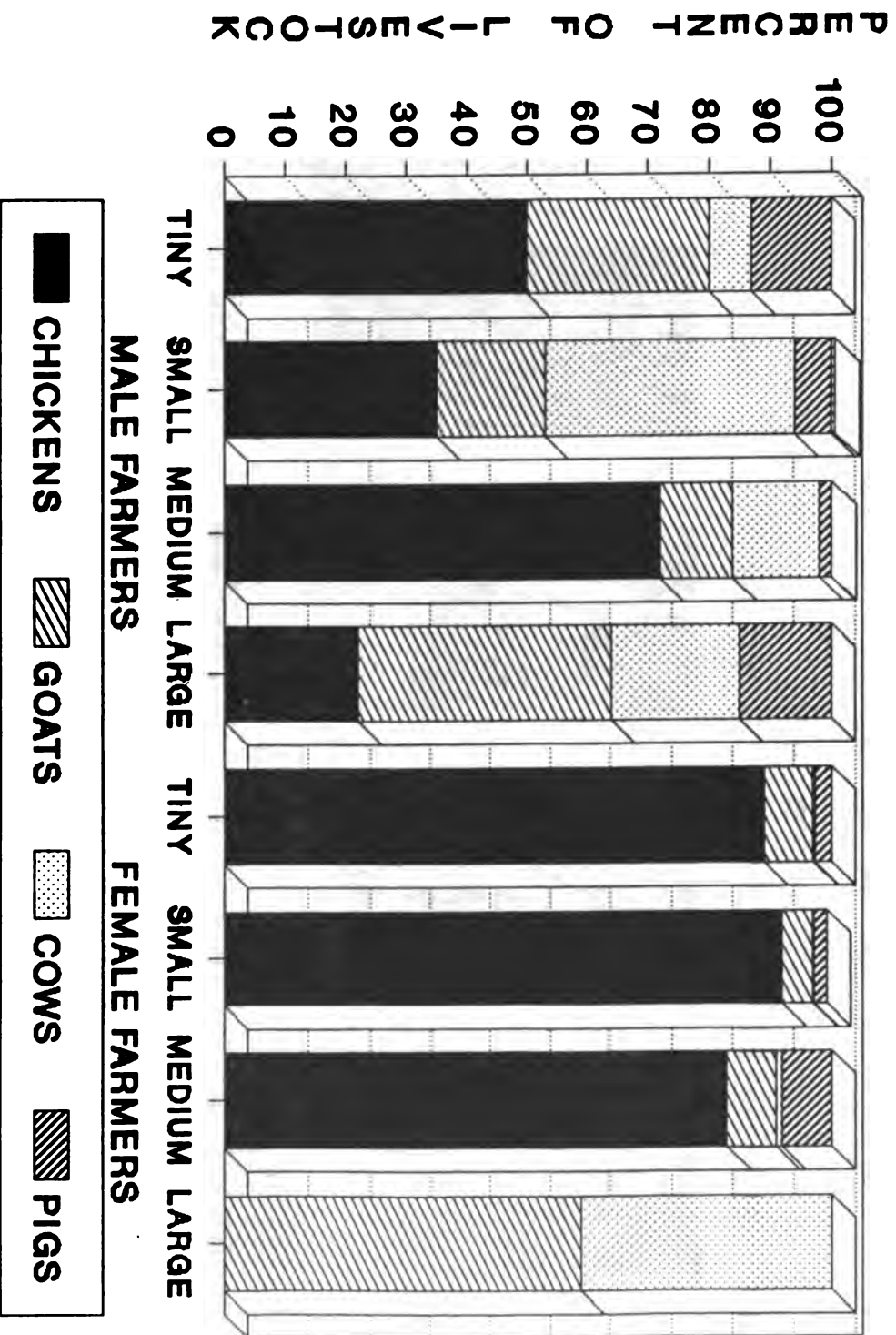


FIGURE 10: NUMBER OF LIVESTOCK OWNED BY GENDER AND FARM SIZE



farms, men had more cows (14%) and goats (12%), but women had proportionally more chickens (83%) and pigs (8%).

Gender differences by farm size for the number of farmers owning livestock were very highly significant for SMALL farmers ($p=0.0002$), but not quite significant for TINY and MEDIUM farmers ($p = 0.07$). The pattern for all three farm sizes was the same with a greater proportion of women farmers owning pigs (22-35%) and chickens (17-24%) than men (pigs 11-15%, chickens 7-9%). More men owned cows (22-38%). There were only six LARGE female farmers, therefore the proportions associated with this group should be viewed with caution.

Age

Livestock ownership patterns varied with age ($p = 0.001$). Older farmers (> 61 years) had more pigs and cows than either younger (>30 years) or middle-aged farmers (31-60 years)(Figure 11). In contrast, the proportion of chickens decreased with age (66%-52%). Middle-aged farmers had fewer goats.

Types of Farming Systems

Farming systems were determined by grouping farmers according to the proportion of the farm devoted to 17 crops using cluster analysis for 232 farms. To be considered as a separate farming system each had to have a minimum of ten farmers which was approximately 5 % of the sample. One farmer who cultivated a single parcel of yams could not be grouped with the other farmers. There were four separate farming systems. The nine crops which discriminated between the farming systems are listed in order of importance in Table 5 ($p = 0.01$). All farming systems had similar proportions of yams, coconut, mango, avocado, pimento, lumber, other trees and other crops.

FIGURE 11: NUMBER OF LIVESTOCK OWNED BY AGE

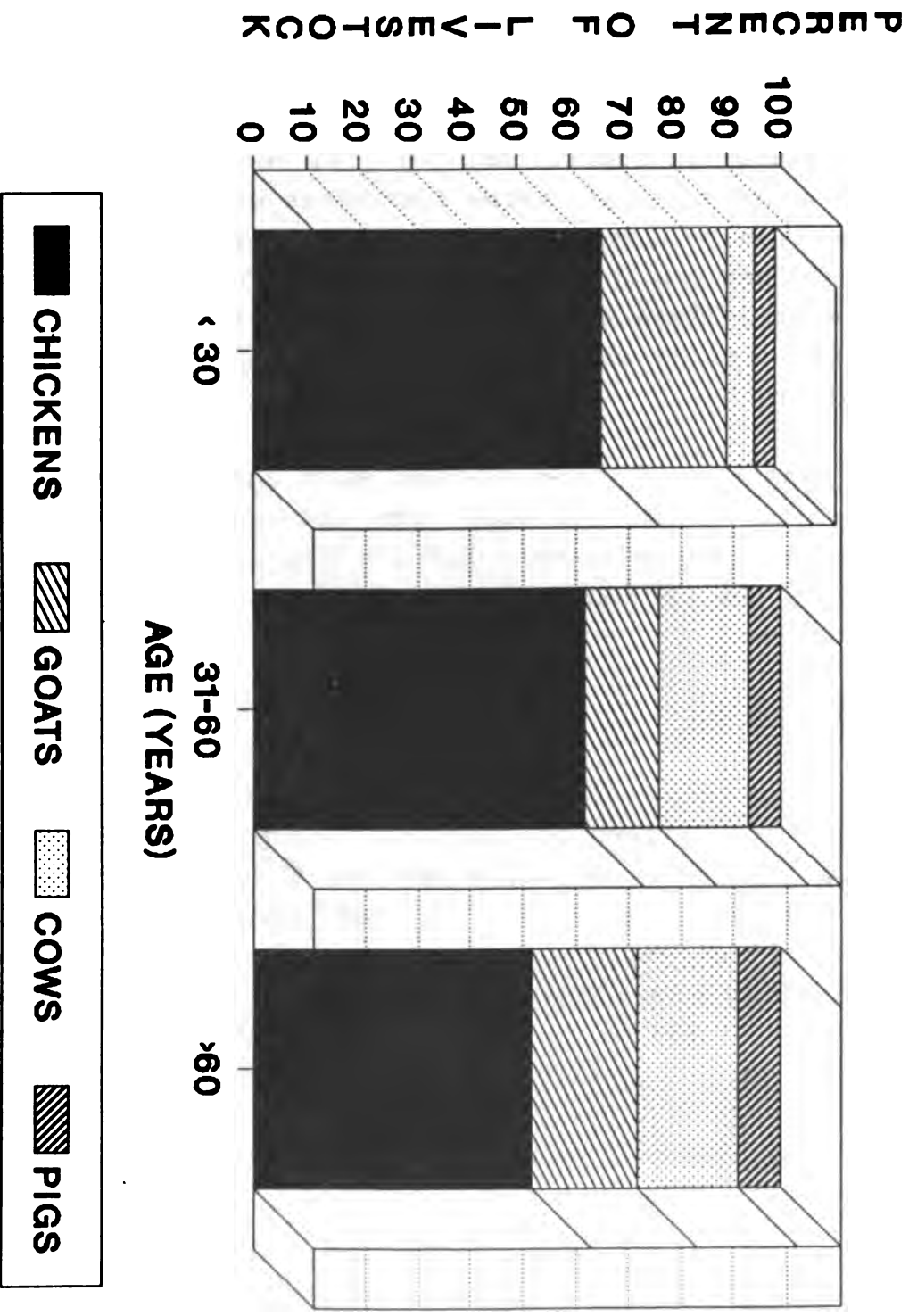
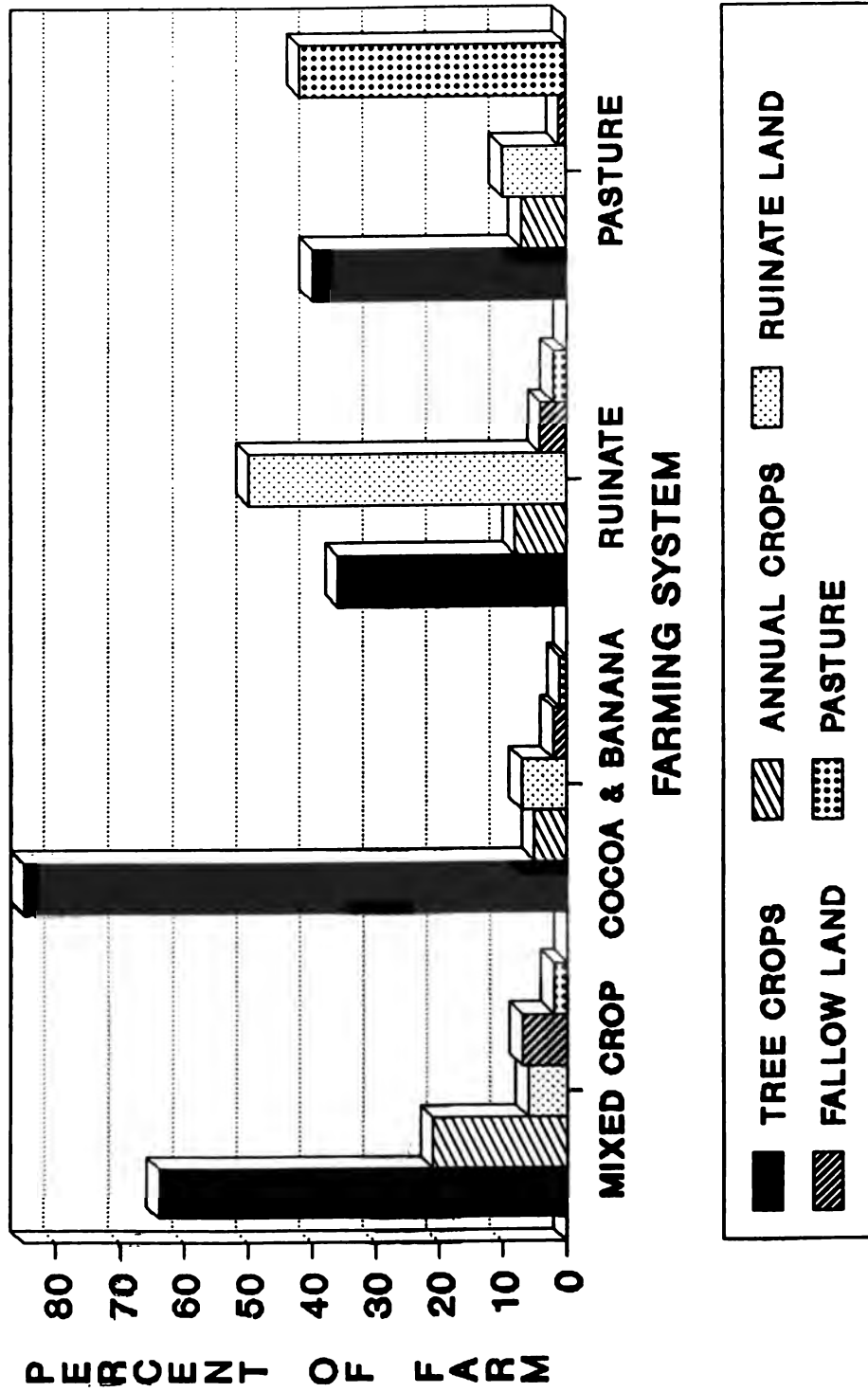


TABLE 5: FARMING SYSTEMS OF THE RIO COBRE WATERSHED DISTINGUISHED BY MEAN PERCENT OF THE FARM CULTIVATED IN A CROP

PROPORTION OF FARM IN THE CROP	MIXED CROP FARMS	COCOA AND BANANA FARMS	RUINATE DOMINATED FARMS	PASTURE DOMINATED FARMS
% Ruinate	6	7	50	10
% Pasture	2	1	2	42
% Cocoa	12	57	13	24
% Citrus	11	2	3	2
% Banana	20	14	9	5
% Pineapple	5	1	1	1
% Coffee	8	5	2	2
% Sugar cane	6	1	1	1
% Annuals	4	1	4	1

Thirty-one percent of farmers (n = 85) had a MIXED CROP farming system which was not dominated by one particular crop. The COCOA & BANANA farming system included 25% of farmers (n = 67), the RUINATE-DOMINATED system included 24% (n = 65) and the PASTURE-DOMINATED system 5% (n = 14). The distribution of annuals to tree crops for each farming system is depicted in Figure 12. Tree crops constituted from 37-85% of all systems, however they were major components in both the MIXED CROP and COCOA & BANANA systems.

FIGURE 12: LAND USE PATTERNS FOR FARMING SYSTEMS



IV. FARMERS' TECHNOLOGY & CROP MANAGEMENT

Tree Crop Cultural Practices

Planting Activities

Eighty-eight percent of farmers indicated that they had planted trees within the past six months. Farmers planted trees irrespective of farm size. However, more male farmers (93%) planted trees than female farmers (75%) ($p < 0.001$). Twenty-eight different tree species had been planted between the months of January to June. The most commonly planted trees were: cocoa (27%), coconut (18%), coffee (18%), cedar (10%), and avocado (4%). Eighty percent of the farmers indicated that they intended to expand the area on their farm under tree crops in the future. There were no differences by age, gender or farm size.

In land preparation for tree planting, 66% of the farmers cleared the land, 12% bushed the land, 3% forked and less than 1% burned. In contrast, 78% of the farmers forked the land for growing cash crops. Eighty-four percent of MEDIUM farmers forked the land once per year compared to 40% of TINY, SMALL or LARGE farmers ($p = 0.03$). Land preparation methods for tree and cash crops did not vary by gender.

Sixty percent of the farmers did not mould tree crops when planting. Of those who did, there were differences by crop ($p < 0.001$). Farmers were less likely (70%) to mould coconut, cedar or banana when planting. In comparison, 50% moulded avocado, cocoa, coffee, citrus and mango.

Forty-seven percent of the farmers used irregular row spacing. Row spacing varied by crop ($p < 0.001$). Approximately one third of the farmers followed the recommended spacing for the crop as highlighted in Table 6. Farmers used similar spacing for cocoa and coffee, avocado and mango, and coconut and cedar.

TABLE 6: PERCENT OF FARMERS USING DIFFERENT ROW SPACING FOR PLANTING TREE CROPS

SPACING (m)	COCOA	COFFEE	COCONUT	CEDAR	AVOCADO	MANGO	CITRUS	BANANA
IRREGULAR	48	43	38	32	75	81	60	25
< 0.9	5	2	2	3	0	0	0	13
0.9-2.3	4	16	5	6	0	0	7	38
2.4-3.5	29	30	17	24	5	6	33	12
3.6-5.3	9	4	11	3	0	13	0	12
5.4-5.9	1	1	8	0	5	0	0	0
> 6.0	4	3	21	32	15	0	0	0

Twenty-four percent of the farmers used irregular planting depths. Planting depth differed by crop ($p = 0.001$).

TABLE 7: PERCENT OF FARMERS USING DIFFERENT PLANTING DEPTHS FOR TREE CROPS

DEPTH (cm)	COCOA	COFFEE	COCONUT	CEDAR	AVOCADO	MANGO	CITRUS	BANANA
IRREGULAR	16	17	17	9	45	35	13	10
< 10	12	8	8	4	14	10	13	0
10-20	20	16	7	36	14	10	13	10
20-30	18	21	5	19	5	15	13	0
30-40	12	19	28	30	18	20	37	30
40-50	19	18	23	0	0	5	6	10
> 60	2	1	12	2	5	5	6	40

Pruning Practices

Eighty percent of farmers had pruned 16 different crops. Cocoa, coffee, banana, and citrus were listed by 92% of the farmers and logwood, pimento, mango and coconut by less than 1% each. Individual farmers pruned pineapple, coco yam, yam, hot pepper, tomato, sweet potato, red pea, and gungu pea. Cocoa and coffee were pruned by more farmers, but less often compared to banana and citrus ($p = 0.007$) (Table 8).

TABLE 8: SUMMARY OF PRUNING PRACTICES FOR TREE CROPS

CROP	TOTAL FARMERS GROWING CROP	NUMBER OF FARMERS PRUNING	PERCENT PRUNING	OVERALL MEAN PRUNING FREQUENCY (TIMES / YEAR)
Cocoa	193	171	89	2.9
Banana	194	142	22	4.9
Citrus	115	23	20	3.5
Coffee	111	87	78	2.4

MEDIUM farmers pruned bananas (5.5 times/yr) and citrus (4.8 times/yr) compared to TINY, SMALL and LARGE farmers at 1.5-2.8 times/yr and 3.6-4.6 times/yr respectively ($p = 0.004$). Mean pruning frequency did not vary by age, except for the oldest farmers (>80) who did not prune citrus ($p 0.005$). Neither pruning frequency nor species pruned differed by gender.

Fertilizer Application

Sixty-seven percent of the farmers reported that they fertilized 37 different crops. Thirteen tree crops accounted for 69% of the responses, the remainder were annual crops (24 species). A complete list is in Appendix IV. With the exception of coffee, less than half of the farmers growing the major tree crops used fertilizer (Table 9).

TABLE 9: NUMBER OF FARMERS UTILIZING FERTILIZER BY CROP

CROP	TOTAL FARMERS GROWING CROP	NUMBER OF FARMERS USING FERTILIZER	PERCENT USING FERTILIZER
Cocoa	193	87	45
Banana	194	76	39
Coconut	145	33	23
Citrus	115	26	23
Coffee	111	63	57
Plantain	77	37	48

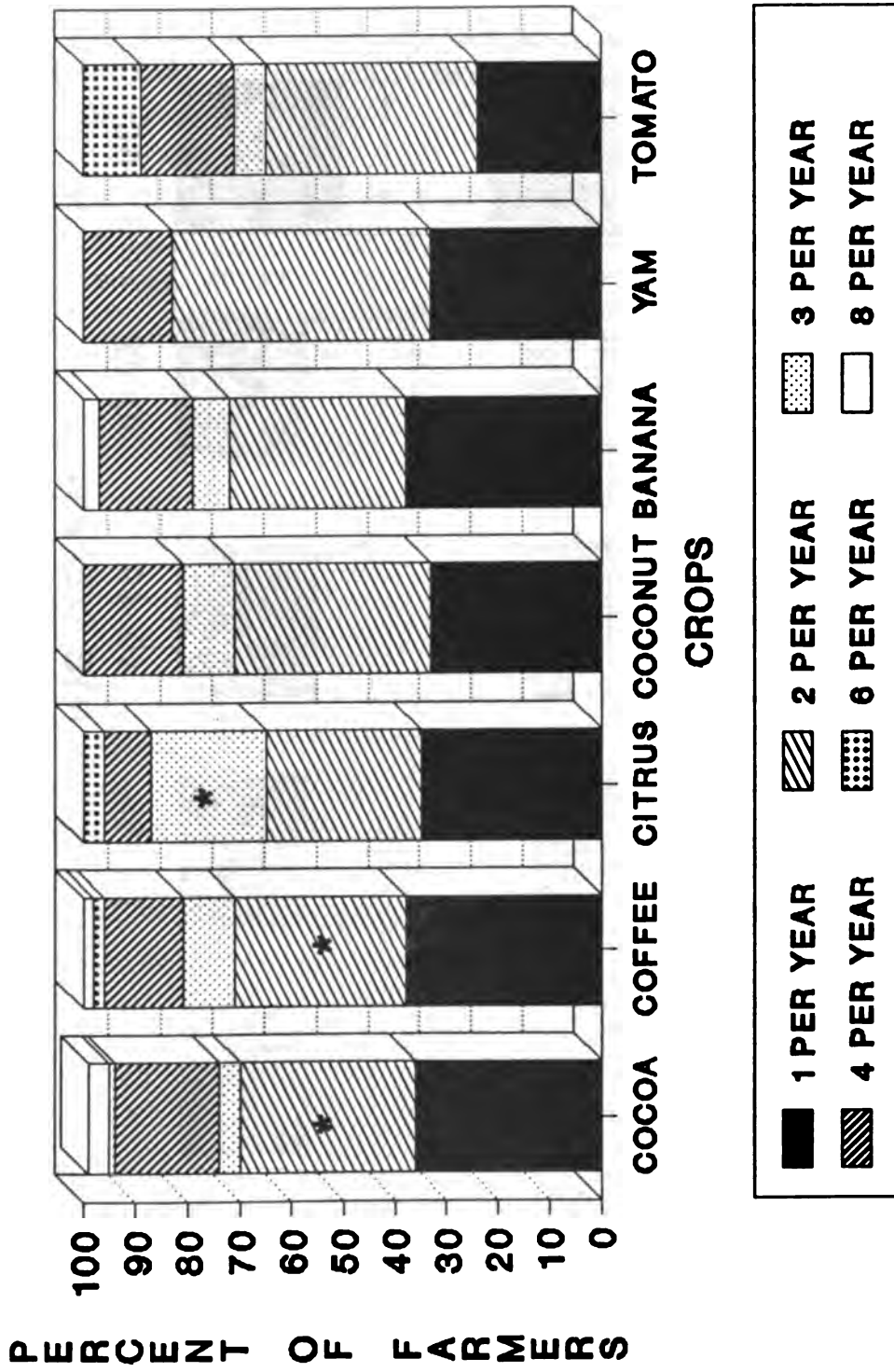
Thirty-seven percent of farmers fertilized once per year and 36% twice per year using inorganic fertilizer. Fifty-two percent of farmers applied organic fertilizer twice per year. Organic fertilizer was applied 2.7 times/yr compared to inorganic at 2.2 times/yr. Few farmers fertilized as often as was recommended for the crop (Figure 13). The crops were divided into two groups based on the application rate for inorganic fertilizer. Cocoa, coffee, citrus, coconut, plantain, banana, yam and tomato were fertilized more often and at a similar frequency than ackee, avocado, pimento, mango and soursop ($p = 0.01$). The percentage of farmers using either type of fertilizer did not vary by farm size.

Application rate for inorganic fertilizer varied by gender ($p=0.005$). Female farmers used it 1.7 times/yr compared to male farmers at 2 times/yr. There was no difference in the frequency of application by gender for a specific crop or for organic fertilizer.

The percentage of farmers using inorganic fertilizer differed by age and crop ($p = 0.004$) (Figure 14). A greater proportion of farmers less than 30 years fertilized banana (35%) and plantain (30%); whereas more farmers over 60 years fertilized citrus (25%) and cocoa (33%). There was no statistical difference in the pattern of crops fertilized for farmers between 31-59 years. The number of farmers using organic fertilizer did not vary by age and crop. Farmers used organic fertilizer on: banana (26%), cocoa (23%), coffee (19%), coconut (16%), plantain (10%) and citrus (7%).

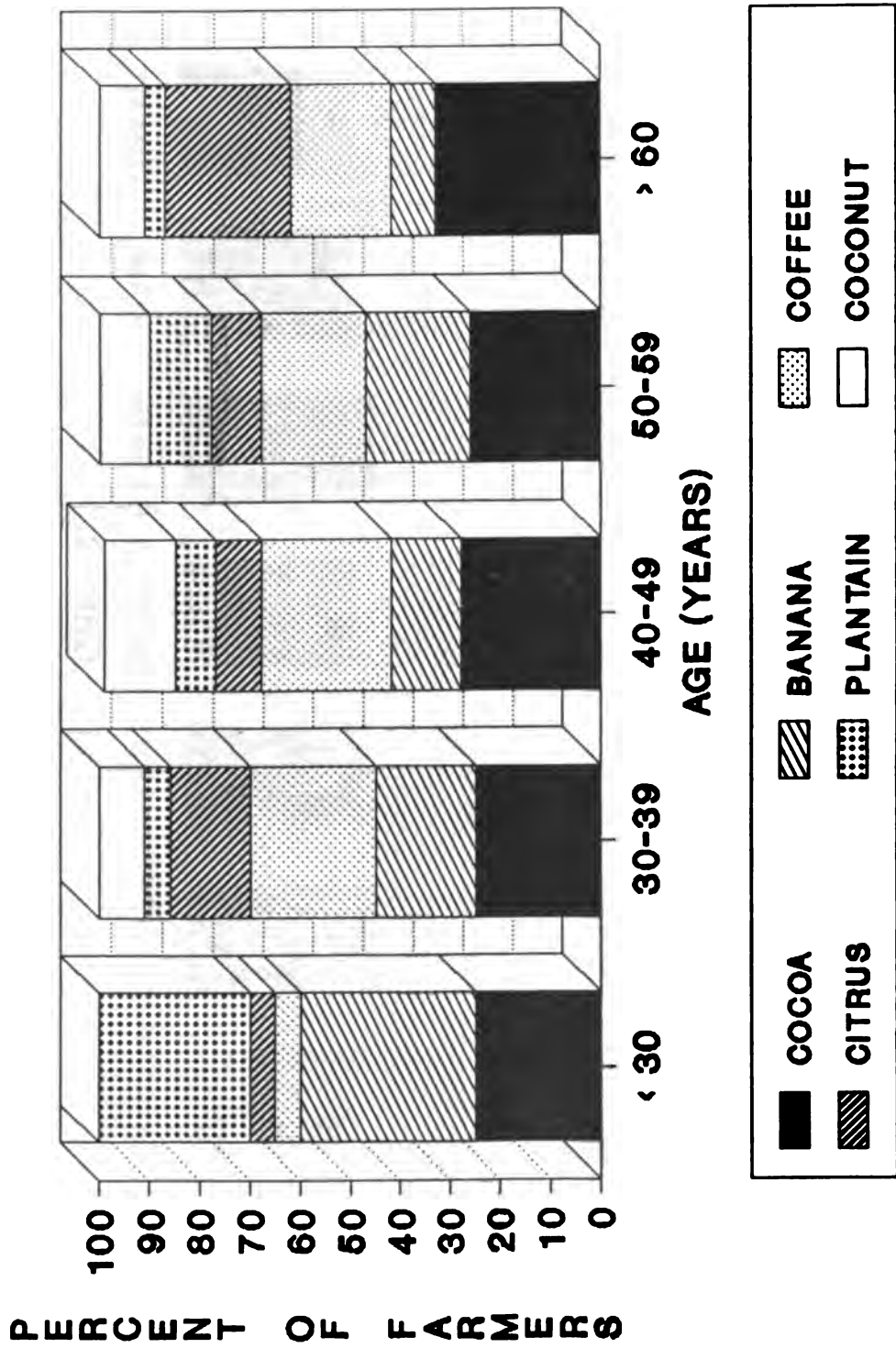
Fertilizer application method varied by crop for inorganic fertilizer ($p = 0.003$). Equal proportions of farmers used banding and broadcasting for: cocoa, coffee, banana, and yam. In contrast, 65-85% of farmers preferred banding for: citrus, coconut and tomato. Organic fertilizer application did not differ by crop; 62% of farmers preferred broadcasting.

FIGURE 13: INORGANIC FERTILIZER RATES FOR DIFFERENT CROPS



• Recommended fertilizer rate

FIGURE 14: INORGANIC FERTILIZER USE FOR DIFFERENT CROPS BY AGE



Pest Management

There was a difference in the number of farmers reporting pest problems by crop ($p = 0.001$). With the exception of cocoa, few farmers reported pest problems (Table 10). Less than 3% of the farmers growing ackee, avocado, breadfruit, coconut, mango or pimento reported pest problems.

TABLE 10: PERCENT OF FARMERS REPORTING PEST PROBLEMS FOR TREE CROPS

CROP	TOTAL NUMBER OF FARMERS GROWING CROP	FARMERS REPORTING PEST PROBLEMS	
		NUMBER	PERCENT
Cocoa	193	127	66
Banana	194	43	22
Citrus	115	27	23
Coffee	111	37	33
Plantain	77	15	34

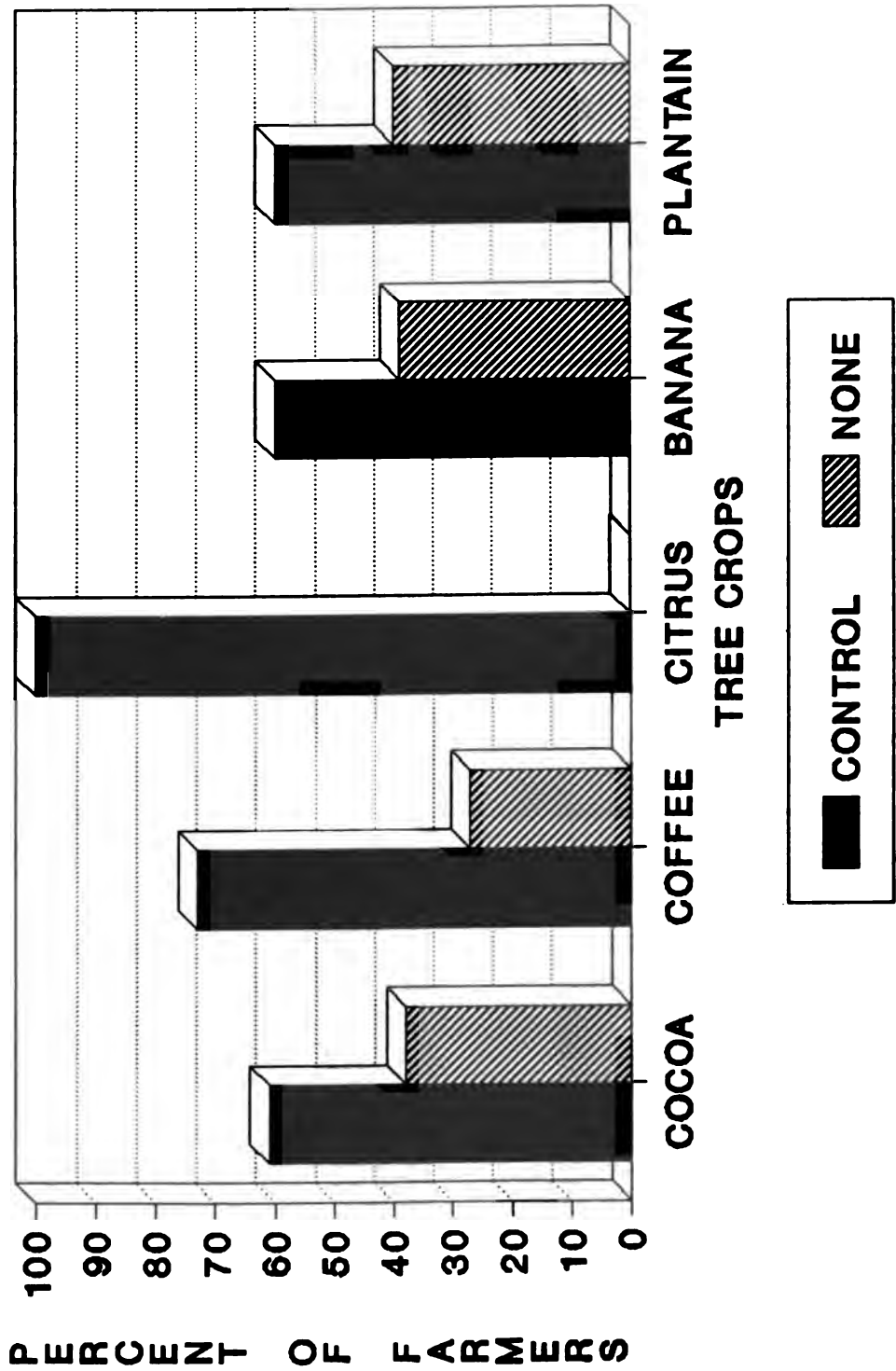
Problems with slugs were most frequently reported for banana, citrus, coffee and plantain; whereas rodents and birds were the two biggest problems for cocoa (Table 11).

TABLE 11: PERCENT OF FARMERS REPORTING DIFFERENT PEST PROBLEMS

CROP	PESTS			
	RODENT	BIRDS	SLUGS	INSECTS
Cocoa	67	19	8	6
Banana	0	0	95	5
Citrus	0	0	85	15
Coffee	19	0	65	16
Plantain	0	0	100	0

Most of the farmers who reported pest problems were trying to control the pest (Figure 15). All citrus farmers were using

FIGURE 15: USE OF PEST CONTROL METHODS FOR TREE CROPS



control methods compared to 60-73% for the other crops ($p = 0.002$). Cocoa, coffee and citrus farmers were more likely to use chemical control than farmers growing banana or plantains ($p = 0.001$) (Figure 16). Farmers made their own pest control methods to combat slugs on these two crops. More information is needed to describe what farmers meant by "local" methods.

Soil Erosion

Sixty-five percent of farmers had observed soil erosion on their farms, however 35% of the farmers did not answer the question. Soil erosion problems were noted regardless of farm size and gender. Gully erosion was the frequently cited type of erosion (Table 12). There was no difference in type of erosion observed and the frequency of forking land for cash crops even though forking is the most intensive land preparation practice.

TABLE 12: TYPE OF SOIL EROSION OBSERVED BY FARMERS

TYPE OF EROSION	FREQUENCY	PERCENT
Gullies	102	37
Soil is less fertile	35	13
Stones or subsoil visible	19	7
Landslide or soil collecting downslope	11	4
Roots exposed or soil washed away	9	3
Crops washed away	2	1
Missing values	96	35
TOTAL	273	100.0

Twenty-three percent of farmers used trenching to control erosion. If the farmers who did not answer the question are combined with those who reported no method used, then 54% did not control erosion.

FIGURE 16: DIFFERENCE IN USE OF CHEMICAL VS. LOCAL PEST CONTROL FOR TREE CROPS

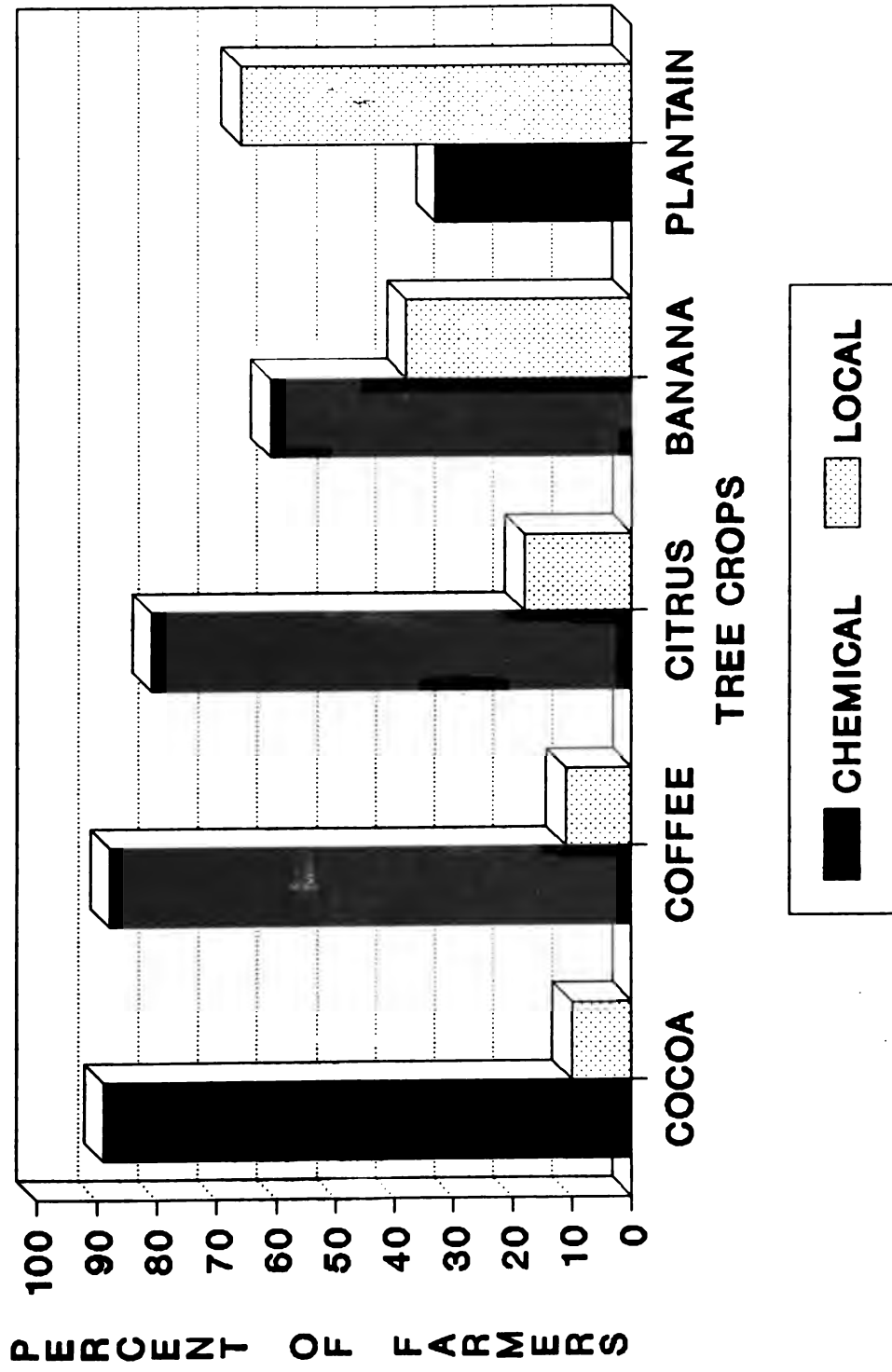
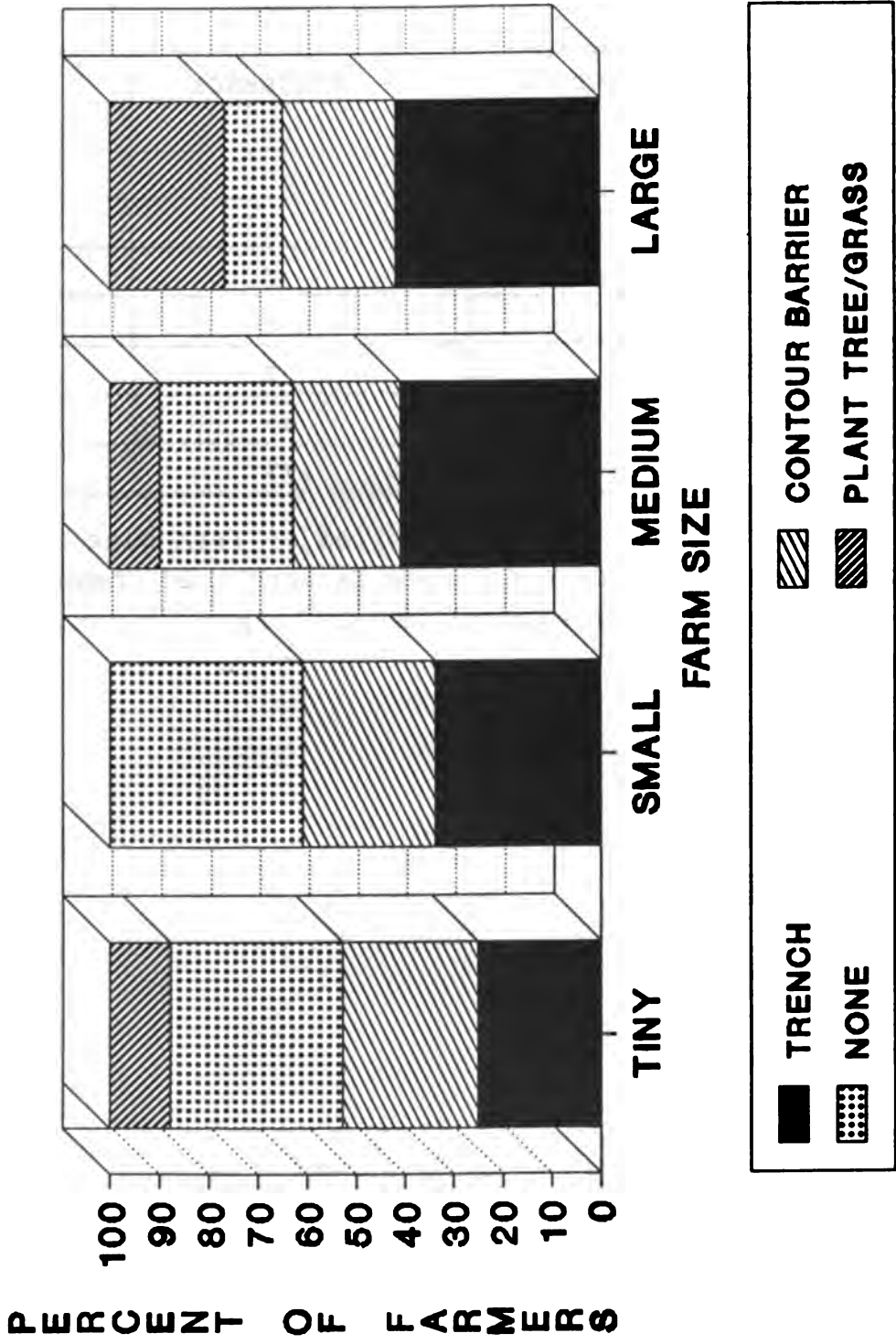


TABLE 13: EROSION CONTROL METHODS USED

EROSION CONTROL METHOD	FREQUENCY	PERCENT
Trench	62	23
Contour barrier	47	17
Terrace	6	2
Plant tree crops	7	3
Plant grass	4	1
None	57	21
Missing values	90	33
TOTAL	273	100

Erosion control methods varied by farm size ($p = 0.02$), but not by gender. LARGE and MEDIUM farmers used trenches. SMALL and TINY farmers used no control (Figure 17).

**FIGURE 17: EROSION CONTROL METHODS USED
BY DIFFERENT FARM SIZES**



V. FARMERS' ACCESS TO RESOURCES

Access to Credit

Nineteen percent of farmers had obtained a loan for farming purposes. The majority of these farmers received their loan from a P. C. Bank (64%), used the loan to purchase plants (63%) and needed no collateral to secure the loan (44%). The range of responses are included in Appendix IV.

Proportionally fewer women obtained credit than men ($p = 0.01$), although just as many had applied (13%). This indicates that even though women applied for loans their applications were more likely to be rejected. Women tended to obtain credit from informal sources such as family and friends ($p = 0.05$) (Figure 18).

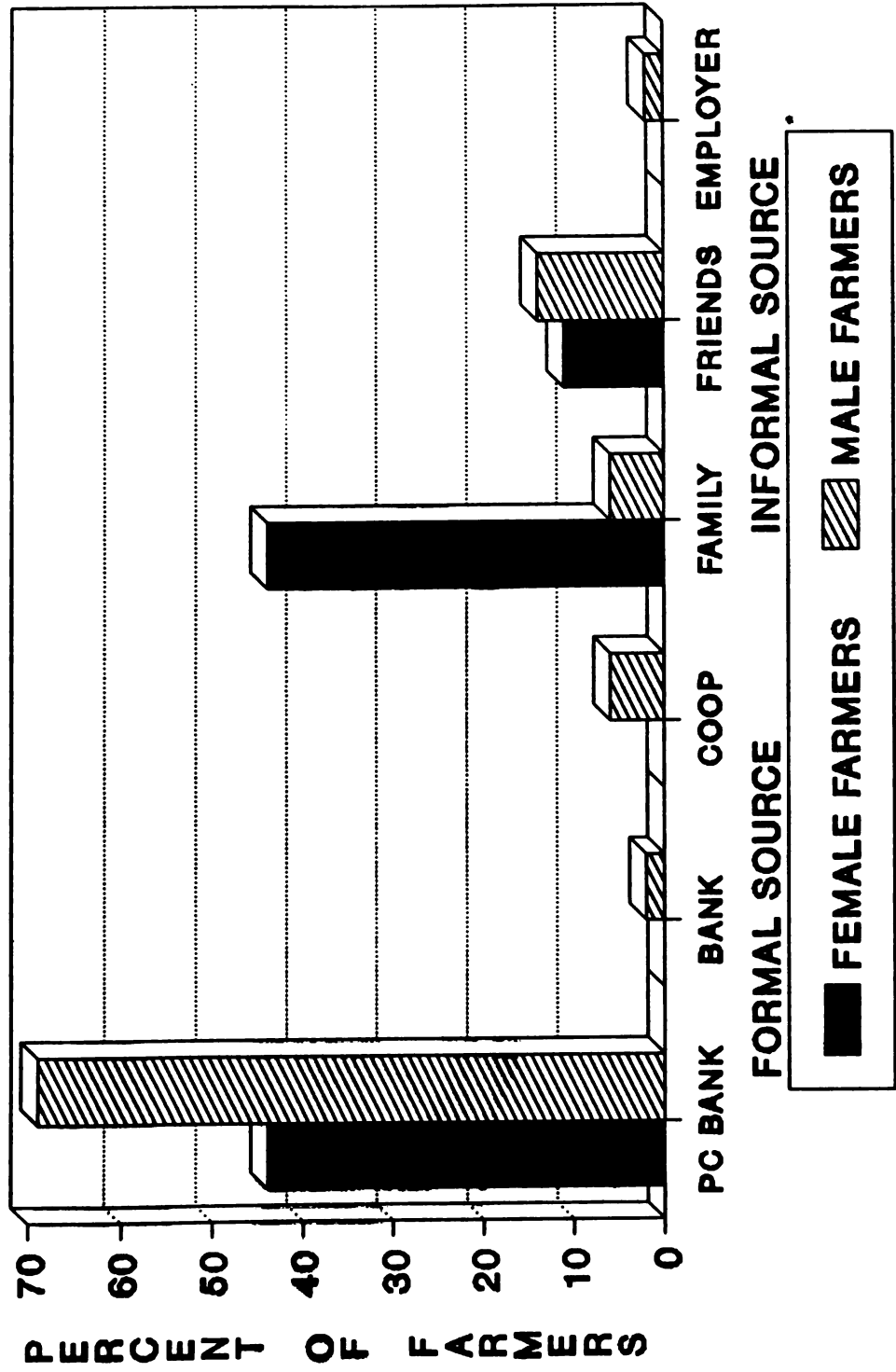
As was the case with female farmers, farmers with smaller landholdings were less likely to obtain credit than those with larger holdings ($p = 0.001$), even though the percentage of farmers that had applied were similar (Figure 19). There were no differences in lending institution by farm size. Seventy-five percent of TINY and MEDIUM farms received loans without collateral; whereas only 25% of LARGE farms did ($p = 0.01$).

Access to Labour

Seventy-four percent of the farmers said that farm labour was available, but it was either expensive or periodic in nature (Table 17). Labour availability did not vary by farm size or gender. Sixty-one percent of farmers paid their workers on a daily basis at a rate of J\$ 40/day compared to 30% who paid by the job at J\$ 380/job.

Men used on average nine labourers for the year ($SE = 0.3$) compared to women who used eight ($SE = 0.5$) ($p = 0.05$). Men hired more labourers and used more male and female labourers in farming than women did ($p = 0.03$) (Figure 20). The mean number of family labourers working did not differ by gender. Men paid more per job

**FIGURE 18: CREDIT SOURCE FOR LOANS
BY GENDER**



**FIGURE 19: BORROWING MONEY TO FARM
BY FARM SIZE**

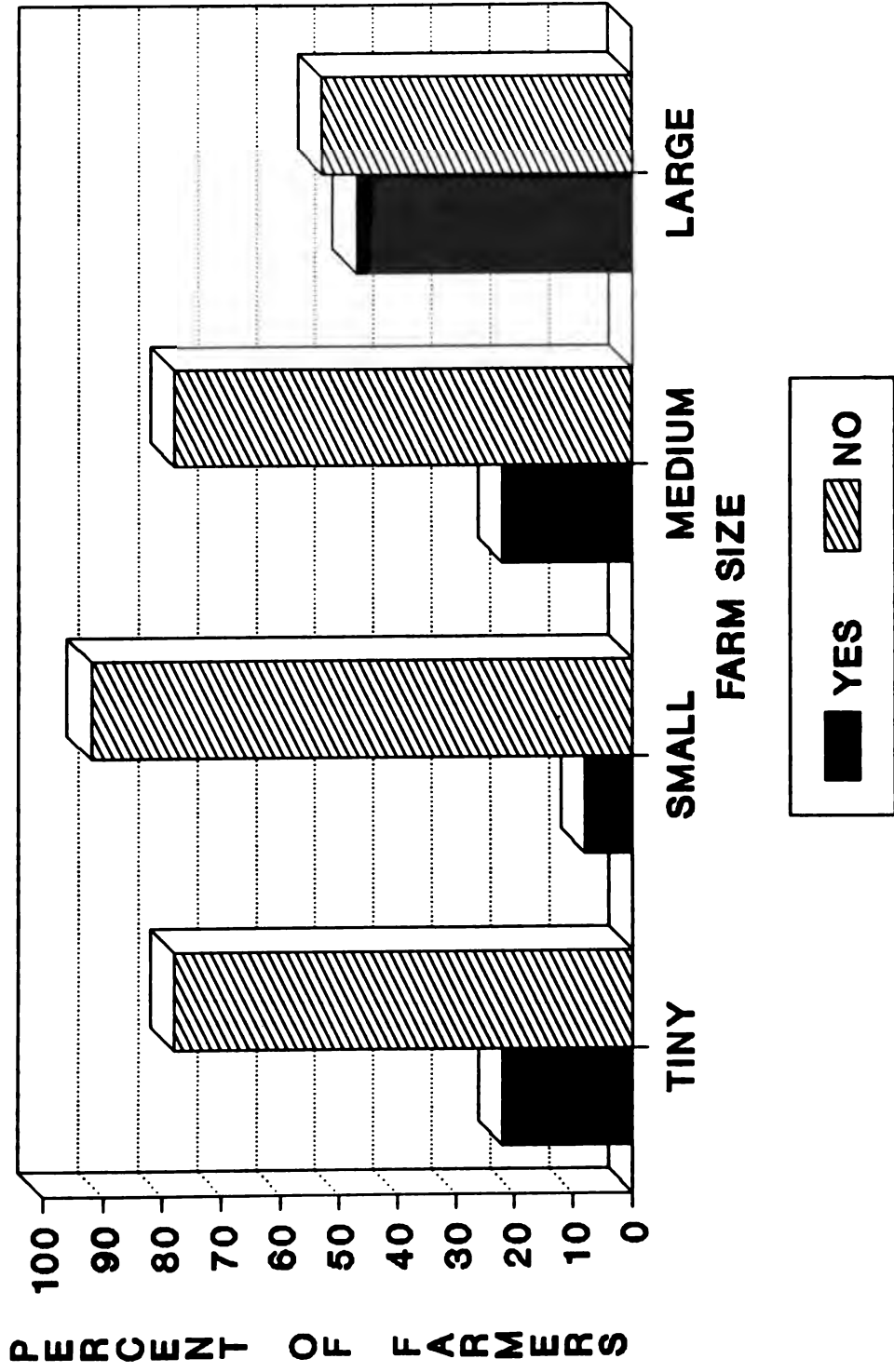


FIGURE 20: SOURCE OF LABOUR BY GENDER

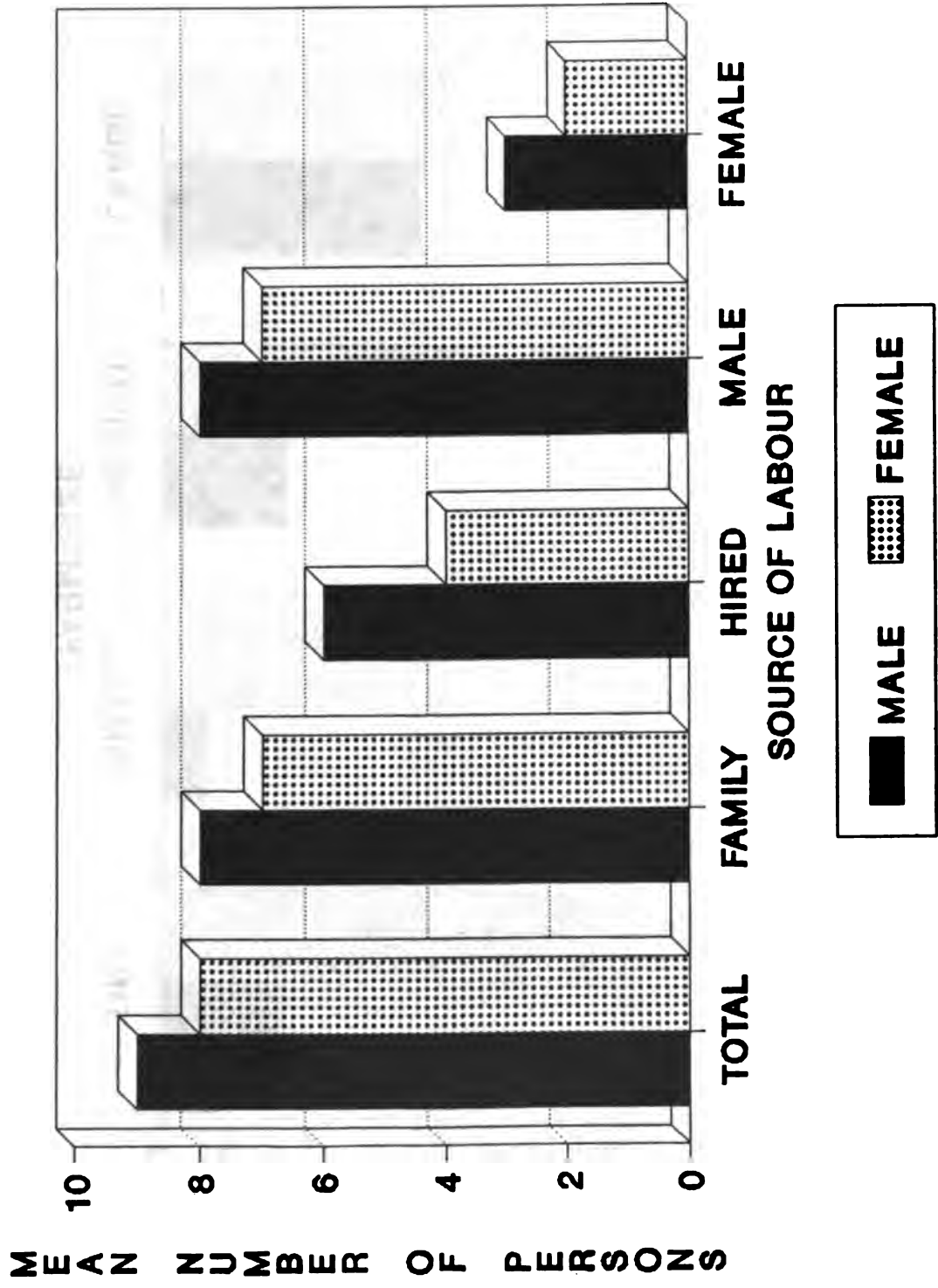


TABLE 17: AVAILABILITY OF LABOUR FOR FARMING

ACCESS TO LABOUR	FREQUENCY	PERCENT
Available, but expensive	117	43
Available	76	28
Available periodically	8	3
Difficult to obtain	63	23
Unavailable	2	1
HASP provided	1	> 1
Missing values	6	2
TOTAL	273	100

(J\$ 503, SE 61) than women did (J\$ 263, SE 34) ($p = 0.0007$), yet daily wages did not differ.

Mean number of labourers working for a farmer varied by farm size. LARGE and MEDIUM farms had seven total workers compared to TINY and SMALL with five ($p = 0.01$). LARGE farms hired 93% of their labourers compared to the other farm sizes which hired 69-73% ($p = 0.01$) (Figure 21). There were no differences in the number of male or female labourers hired by farm size.

Off-farm Income

A third of the farmers had access to off-farm income ($n = 91$) (Table 18). Wages or salaries contributed more income than other source ($p = 0.01$).

FIGURE 21: SOURCE OF LABOUR BY FARM SIZE

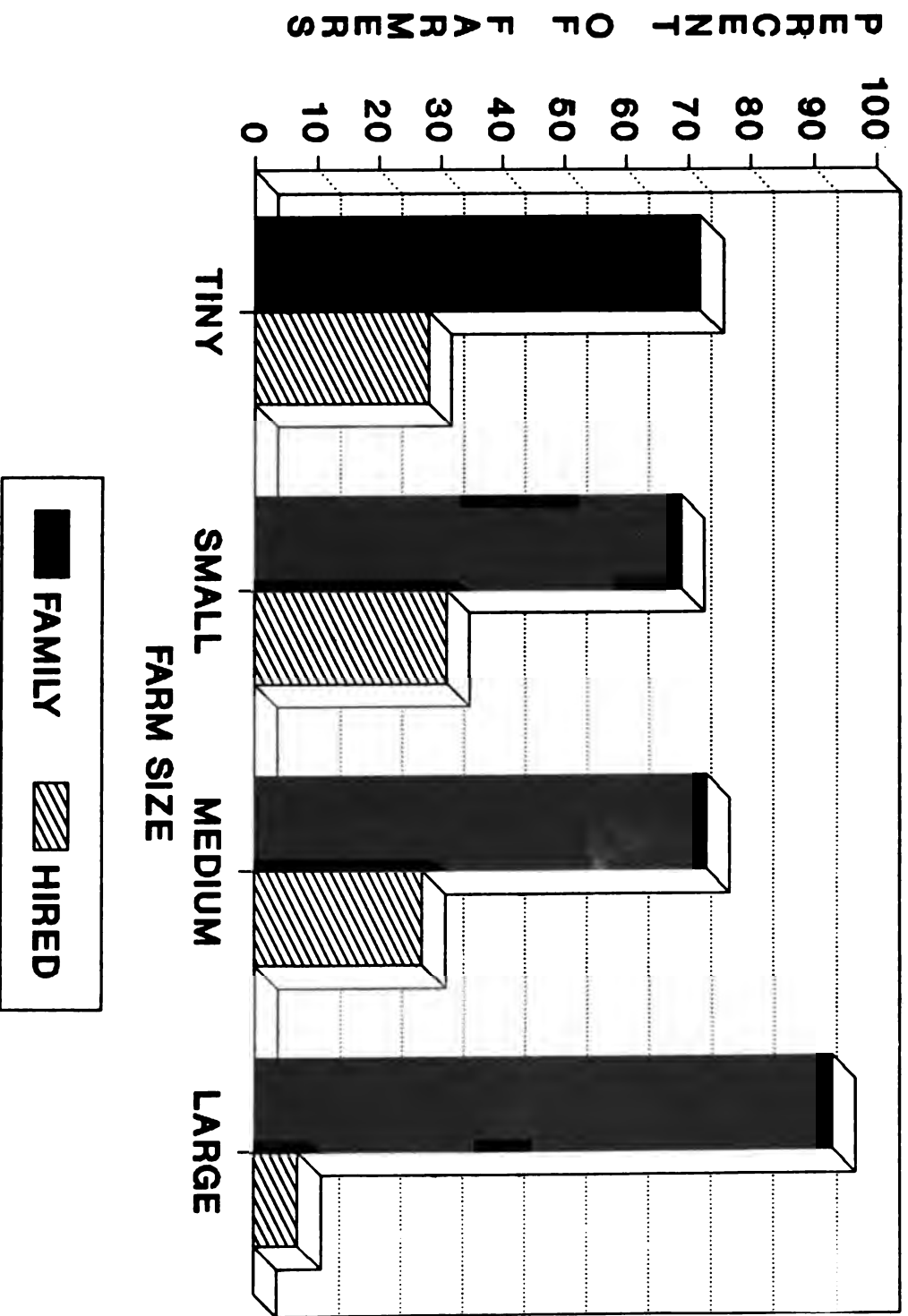


TABLE 18: FARMERS SOURCES OF OFF-FARM INCOME

SOURCE	AMOUNT OF INCOME (J\$)			FARMERS WITH OFF-FARM INCOME	
	< 250	250 < 600	> 600	NUMBER	PERCENT
Wages/Salaries	8	7	24	39	43
Business	2	3	15	20	22
Remuneration from abroad	4	3	8	15	16
Pension	2	0	3	5	5
Other	9	1	2	12	12
TOTAL	25	14	52	91	100

Assets

Seventy-seven percent of farmers had access to a: radio, television, motorcycle, bicycle, car, water tank or refrigerator. Fifty-three percent had a radio as their main asset. Twenty percent had a television and 15% had a refrigerator. Less than 8% owned any means of transportation.

Market Problems

Low price, low market demand and lack of transportation were the most common marketing problems (Table 19).

Farmers reported having market problems for 35 different crops. The type of market problem reported varied by crop ($p = 0.001$). Low prices were the biggest problems for banana (44%) and plantain (37%). Lack of transportation was an obstacle in marketing cocoa (30%), yams (38%) and pineapple (60%). Low prices and demand affected tomatoes.

FIGURE 22: MARKET PROBLEMS BY CROP

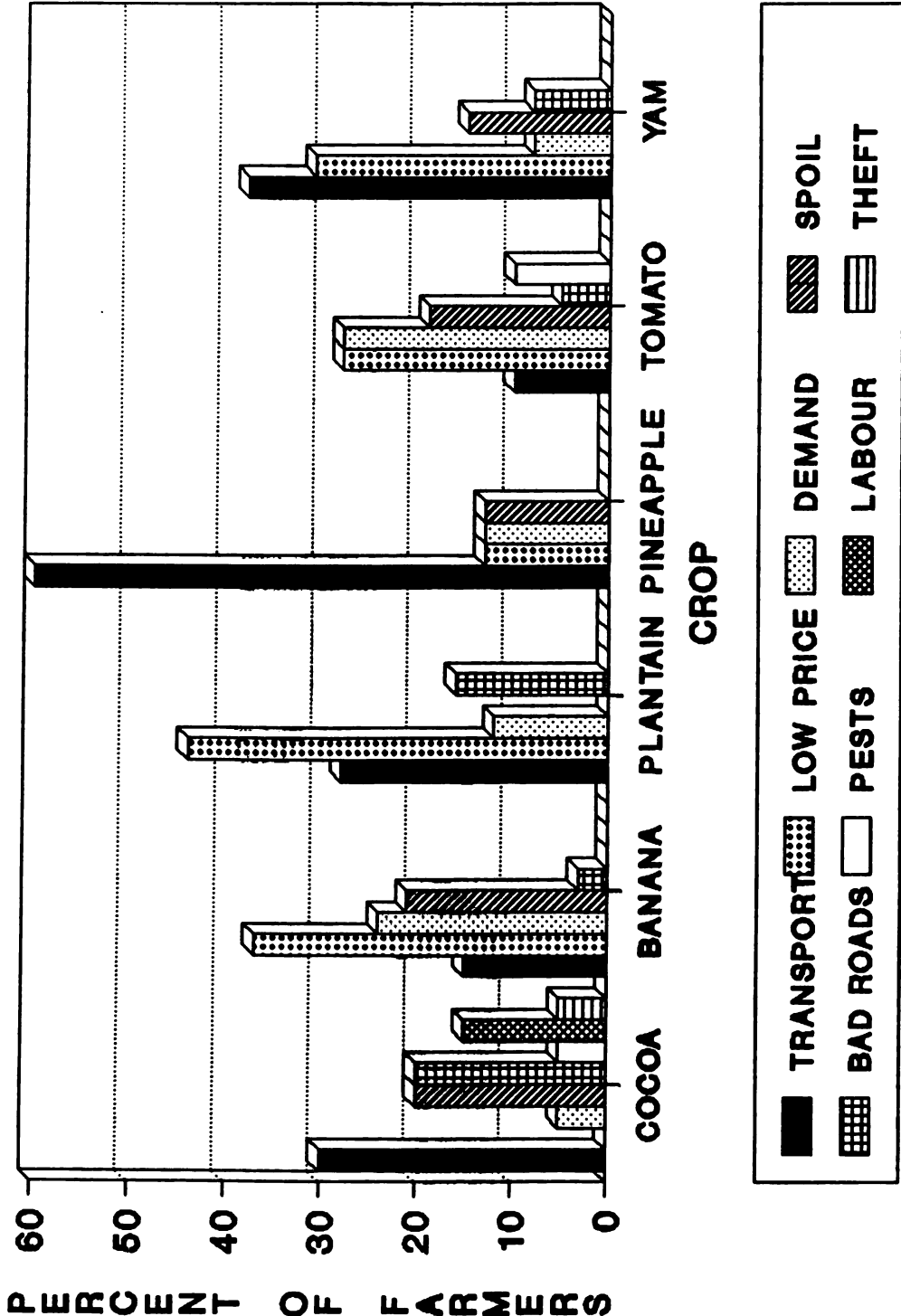


TABLE 19: MARKET PROBLEMS LISTED BY FARMERS

MARKET PROBLEM	FREQUENCY	PERCENT
Low prices	107	29
Low demand	74	20
Lack of transportation	73	20
Crops spoiling	58	16
Bad roads	30	8
Lack of labour	9	3
Pests or diseases	6	2
Drought	5	1
Praedial larceny	3	1
Cost of transportation	1	> 1
TOTAL	365	100

VI. FARMERS' SOURCES OF INFORMATION

Agricultural Information

Radio and friends were the two most important sources of agricultural information (Table 20). Source of agricultural information did not vary by farm size, age or gender.

TABLE 20: FARMERS' SOURCES OF AGRICULTURAL INFORMATION

SOURCE OF INFORMATION	FREQUENCY	PERCENT
Radio	133	21
Friends/relatives	113	18
McDonald/Farmers' Almanac	105	17
Agricultural officer	76	12
JAS	57	9
Television	45	7
Farmer training	37	6
Newspaper	26	4
Own experience	21	3
HASP meeting	6	1
Banana Board	2	> 1
School	1	> 1
Extension booklet	1	> 1
Received no information	1	> 1
TOTAL	624	100

Extension Services

Ninety-seven percent of farmers indicated that they would be willing to try new agricultural methods, yet 40% reported ever having used extension advice in the past. In general, few farmers disagreed with the advice they had been given because the majority (88%) said they hadn't received any visits or advice from an agricultural officer.

Fewer women (25%) used advice from agricultural officers than men (45%) ($p = 0.005$). Half of the LARGE and MEDIUM farmers used extension advice while only a third of the SMALL and TINY farmers had ($p = 0.01$).

Farmers' Organizations

Seventy percent of the farmers were members of a farmers' organization (Table 21). Nine percent of the members held an executive office or worked as a selector for the organization. The median duration of membership in any of the organizations was 10 years with a range from a few months to 60 years. Farmers differed in their reasons for membership in an organization ($p = 0.001$) (Figure 22). Marketing was the main reason for belonging to the commodity board supported organizations. JAS members cited information (49%) and advice (29%), JLA for information (100%), P.C. Bank for credit (86%) and HASP for inputs (69%).

TABLE 21: MEMBERSHIP IN FARMERS' ORGANIZATIONS

ORGANISATION	FREQUENCY	PERCENT
Cocoa Cooperative	140	40
Coffee Cooperative	70	20
Jamaican Agricultural Society (JAS)	68	20
P. C. Bank	16	5
All Island Banana Growers Association (AIBGA)	14	4
Coconut Growers Association	14	4
HASP	13	3
Citrus Growers Association	7	2
Jamaican Livestock Association (JLA)	3	1
All Island Cane Growers Association (AICGA)	2	> 1
TOTAL	347	100

FIGURE 23: REASONS FOR MEMBERSHIP IN FARMERS' ORGANIZATIONS

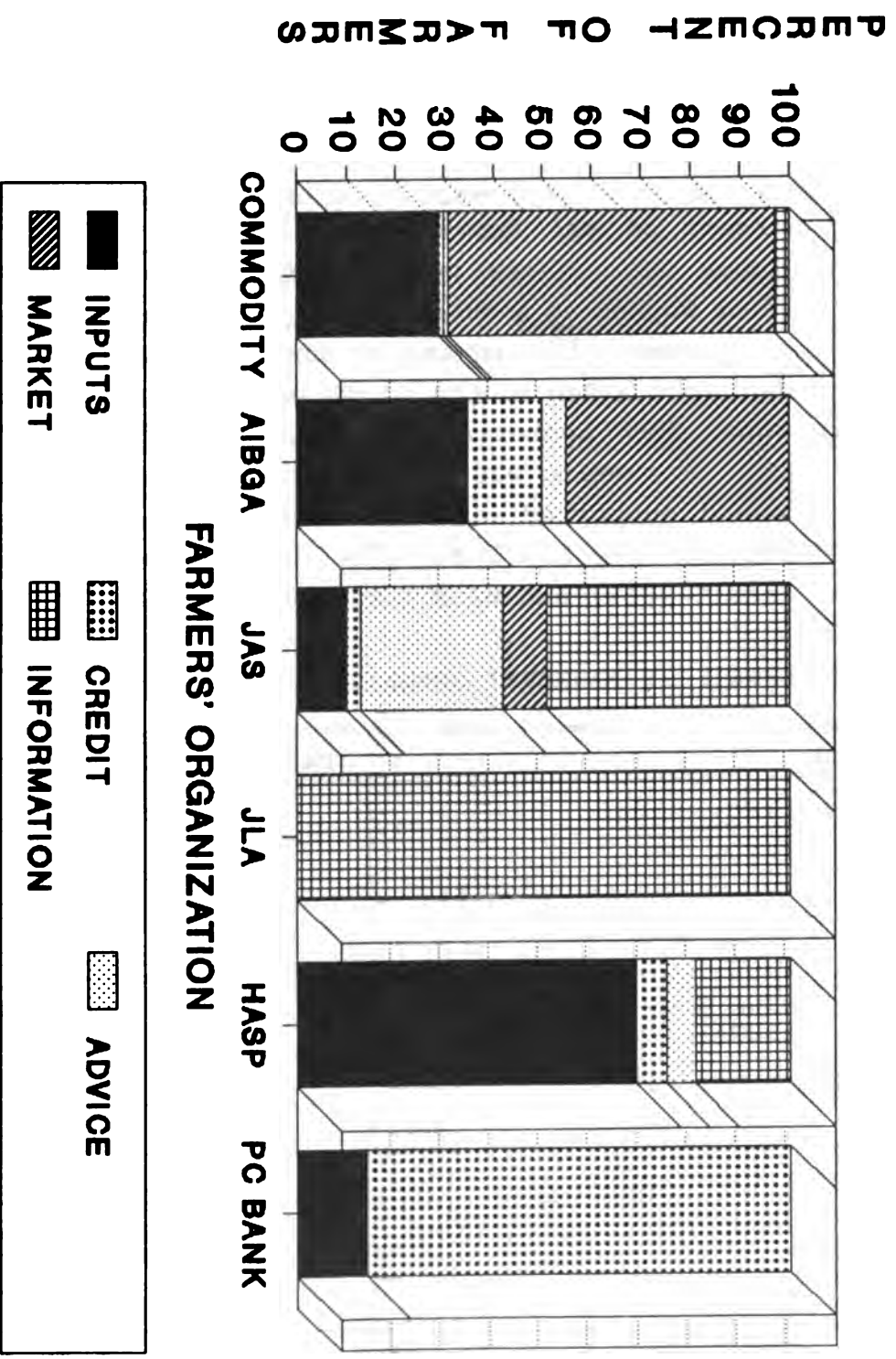
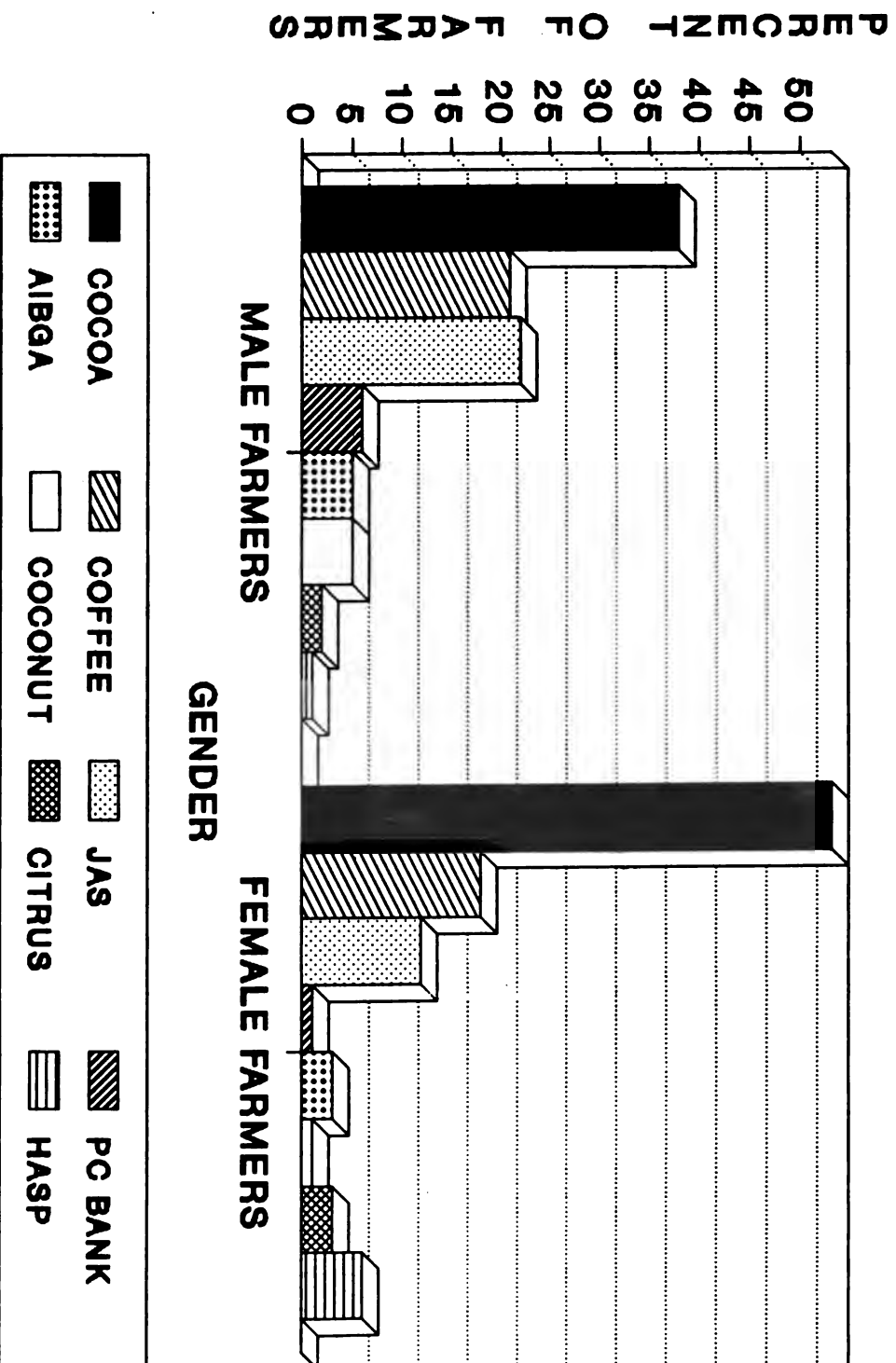


FIGURE 24: MEMBERSHIP IN FARMERS' ORGANIZATIONS BY GENDER

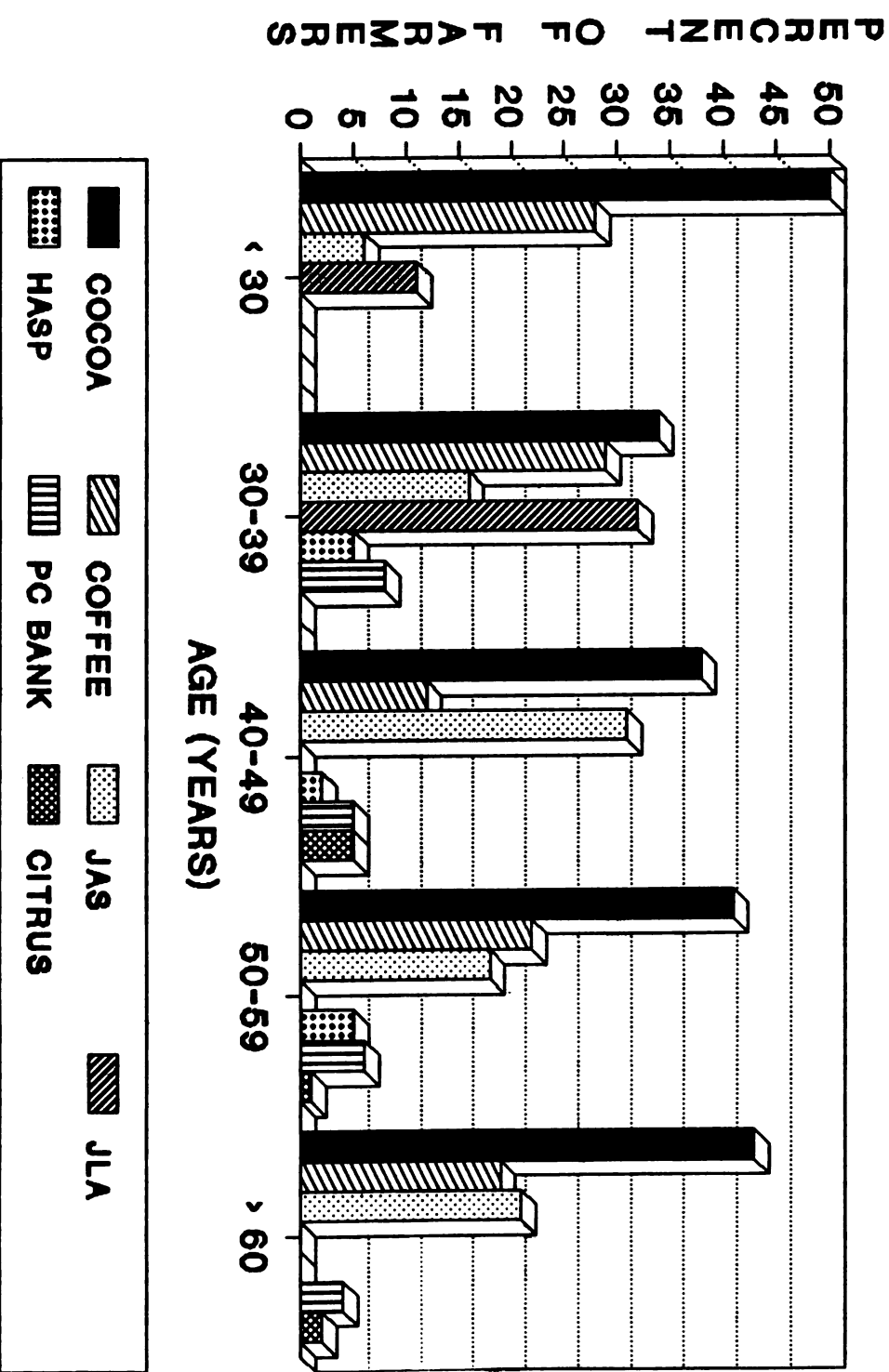


Membership in farmers' organization varied by gender. Men belonged on average for 15 years (SE 0.8) compared to 13 years (SE 1.2) for women ($p = 0.06$). Men were members in 2.4 organizations (SE 0.06) and women in 1.9 (SE 0.09) ($p = 0.008$). Women were more likely to belong to: Cocoa Cooperative, HASP, JLA, Citrus Growers Association and the AICGA ($p = 0.04$).

LARGE and MEDIUM farmers were members of 2 organizations compared to SMALL and TINY farmers who belonged to 1.5 ($p = 0.0002$). There was no difference in length of membership by farm size.

Younger farmers belonged to different organizations than older farmers did ($p = 0.006$) (Figure 24). Farmers less than 40 years were members of: Coffee Cooperative and JLA. Those over 40 years were more likely to be members of JAS, Citrus Growers Association, and P.C. Bank.

FIGURE 25: MEMBERSHIP IN FARMERS' ORGANIZATIONS BY AGE



VII. CONCLUSION & RECOMMENDATIONS

Agro-forest technologies are not socially neutral (Scherr, 1990). Differences in access to labor, credit and land between groups and individual farmers within a community will influence the ability of that person or group to use a particular forest technology. Within a community, not all small farmers have the same access to resources nor the same production goals (Garret, 1984). For example, an older subsistence farmer whose children have migrated to the urban centers may not have access to family labor during peak demand periods. His objective in farming may only be to produce enough for home consumption with little or no surpluses for market because his employed children supplement his earnings. He may not have sufficient capital or labor to adopt labor-intensive operations intended to increase production such as rehabilitative pruning and fertilization of cocoa trees. In contrast, a commodity-oriented smallholder may be producing primarily for the market. Cash crop sales provide additional income for purchasing labor at peak periods. The cash crop producer may be able to pay for additional inputs if production increases result. The technology needs of the two farmers differ.

Cernea (1988) stresses how critical the proper fit is between technology selection, the needs of the social actors who are project beneficiaries and the organizational structure within the community and government institution. Even basic technical decisions in agro-forestry operations such as the type of planting configuration have social and organizational implications. Trees planted in blocks, rows or a mixed-cropping arrangement require different socio-economic conditions of the farmers themselves, land tenure agreements and institutional provisions. For example, a farmer cultivating a microplot of less than one hectare of land would be hard-pressed to devote a large area of land or invest lots of scarce labour to a block planting of citrus trees. Yet, he might readily be able to plant a row of different multi-purpose trees around the border of the plot. Government planners of tree crop projects must recognize differences in production goals and

constraints of different farmers in relation to the socio-economic requirements of the technology which they wish to introduce.

The choice of planting configuration and management practices which make up a technology package also produce very different results. For example, land sizes and management conditions directly affect yield in cocoa. The average yield for a 0.5-1.0 ha of densely intercropped cocoa under management conditions characterized by limited investment in labor, high shade, moisture, and disease, greater than 10% slope and no fertilizer, fungicide or insecticide is 150 kg/ha spread out over 9 months (Alvim and Trout, 1986). In contrast, yields of 650 kg/ha are obtained using varieties which require 2-25 ha blocks of cocoa managed using a high labour investment, low shade, moisture and disease, less than 10% slope and regular use of fertilizers, insecticides and fungicides (Fagan and Topper, 1988).

What information about farmers' constraints and technological requirements can be gleaned from the baseline survey results? Constant cash flow, low prices, transportation and the cost of labour were the major problems listed by all farmers indicating that any new technologies must be low cost, labour efficient and assure a steady income over time. A third of the farmers had other income sources and 58% spent many years off the farm which indicates that some farmers had time constraints.

The results indicated that tree crop based farming systems predominated in the area, however a significant percentage of farmers had ruinate (24%) and pasture-dominated systems (14%) with fewer trees. The survey was originally designed to separate the different types of tree crop management practices by farm size, however more information could be extracted from the data to describe the technological needs of farmers based on their farming system.

Farmers with less than 2.3 ha (TINY and SMALL) had less land, labour, credit, and information either via extension or a farmers'

organization. A large proportion of these farmers were women. They planted fewer trees, used less fertilizer, and practiced little/no erosion control. Their farms were very mixed systems which were more likely to have cocoa, bananas, goats (men) and chickens (women). They need technologies which perform well in highly intercropped conditions.

LARGE and some MEDIUM farmers had more area in cocoa, banana, coffee, citrus, mango, pimento, other trees and pasture. They also had more cows. They were more likely to have access to more parcels of land, labour, credit and agricultural information. The technical requirements of high-yielding varieties better fit their conditions.

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IX. APPENDICES

APPENDIX I: SURVEY METHODS AND ANALYSIS

Introduction

This section describes the statistical methods used to analyze the data from the baseline survey. Only a brief overview of the methods used in design and data collection for the survey are included because a complete summary is found in, "The Baseline Survey Procedures Manual" (MINAG/IICA, 1992).

Target Population and Sampling Frame

All farmers who cultivated not less than 0.23 ha of land with crops or livestock with at least one cow or its equivalent in other livestock (ie. 20 chickens) were included in the sampling frame. A new listing of all farmers was made because the previous agricultural register of 1982 was out-dated. The Farmers' Register survey was developed by HASP in April/May 1990 and included 1, 741 farmers (see Appendix III). The project area was divided into three administrative areas as follows:

A D M I S T R A T I V E A R E A S		
I	II	III
Jubilee Town	Pear Tree Grove	Crawle I
Crawle II	Facey	Harewood
Hamwalk	Rosehill	Riversdale
Redwood/Cedar Valley	Troja	Hampshire
Seafield		Gobay
Golden Grove		

The main variables of interest were assumed to be dependent on farm size. A stratified random sample was taken for the Baseline Survey using the Farmers Register as the sampling frame. The stratification is shown in the following table:

STRATUM CLASS	SIZE OF HOLDING (ha)	ADMINISTRATIVE AREAS			TOTAL NUMBER OF FARMERS	SAMPLE SIZE	STRATUM WEIGHT
		I	II	III			
TINY	< 0.9	168	210	163	514	94	0.31074
SMALL	0.9 < 2.3	202	212	200	614	106	0.35267
MEDIUM	2.3 < 4.5	140	107	138	385	67	0.22114
LARGE	> 4.5	62	55	84	201	35	0.11545
TOTAL		572	584	585	1741	302	1.00000

A random sample was then selected for each stratum using proportional allocation. The estimation procedure is detailed in the Baseline Procedures Manual.

Questionnaire Design

The baseline questionnaire included 46 questions. Highlighted subjects (*) were analyzed for this report as indicated below. Other subject areas are either being analyzed separately or too little data was collected to warrant their being included. For a complete copy of the original survey see Appendix II.

- 1)* Demographic and social data on the rural farm family
(limited to age and gender)
- 2)* Membership in farmer organizations
- 3) Type of housing and social amenities
- 4)* Farm labour utilization and availability
- 5)* Farming systems

per strata. To determine whether this discrepancy would affect the results, two analysis were run for each question: 1) using the total sample, and 2) reducing the number of farmers in the small, medium and large classes (N=206) to reflect the appropriate stratum weight. No significant differences between the two analysis were found for the statistical tests, therefore the larger sample in each case was used in the analysis.

Univariate analysis including: frequency distributions, mean, mode, median, minimum, and maximum values were computed for selected questions from both surveys. Frequency distributions are included in Appendix IV.

Bivariate analysis was used for testing age, tenure, gender and farmsize differences. A minimum significance level of $p = 0.05$ was used. In the text **significant** is used to indicate the 0.05 probability level, **highly significant** for a probability level of 0.01 and **very highly significant** a probability greater than 0.001. Precise probability levels are included in the appendix for each test. T-tests were used to compare differences between the means of two numeric variables to answer such questions as: Do female farmers have larger farms than male farmers? Chi² tests were used to test if a statistically significant relationship existed between two categorical variables. For example, the test was used to answer the questions: Do proportionally more farmers with large landholdings gain access to formal agricultural credit than farmers with smaller landholdings?

Multivariate analysis was used for testing whether age, gender or farmsize were variables which could be used to explain differences in cropping patterns. Analysis of Variance (ANOVA) was used together with the Duncans Multiple Range Test and Orthogonal Contrasts to determine whether there were significant differences between means. Hierarchical Clustering was used to produce a dendogram to group farmers with similar cropping patterns.

Non-parametric analysis was used for examining cultural practices for tree crops including pruning frequency, fertilizer

- 6)* Pest and disease control
- 7) Farm income, expenditure and marketing
- 8)* Access to credit and use
- 9)* Farmers' goals and decision making
- 10)* Farmers' sources of information
- 11) Constraints to land utilization
- 12)* Environmental issues

Data Collection

Three College of Agriculture students and two data collection officers were contracted to implement the questionnaires. All enumerators were trained in agriculture and were familiar with data collection procedures. One field supervisor administered the team of enumerators. The core HASP team provided logistical support for the field work. Data for the questionnaires were collected using face-to-face interviews with the farmers during an eight week period from July-September 1990. It is estimated that each enumerator averaged three interviews per day and completed approximately 90 questionnaires.

Statistical Analysis

Results from the Baseline Survey were combined with matching responses from the Farmers' Register Survey to broaden the analysis to include a data on cropping patterns, socioeconomic variables and cultural practices. Computer programs were employed in the analysis: 1) SAS/STAT 6.03 program (SAS Institute, 1988), 2) SYSTAT program (Wilkinson, 1988) and 3) StatXact (CYTEL, 1991). The sample size was slightly smaller (n = 273) than the originally designed (n = 300) and disproportionate with regard to sample sizes

use, and pest management. Spearman's Rank-Order Correlation Coefficient was used to rank median areas planted in a crop and then overall cropping patterns were compared for LARGE, MEDIUM, SMALL and TINY farm sizes.

9. (a). HOW FAR IS EACH PARCEL FROM HOME?
 (b). HOW OFTEN DO YOU GO?

(a)	(b)		(c)	(d)	(e)
PARCELS	DISTANCE (miles)		RETURN JOURNEY	FRE-QUENCY	CONSTRAINTS TO FULL UTILIZATION
	From Home	From Main Rd			
N/P					1. Lack of funds to develop land 2. Unavailability of labour 3. High cost of labour 4. Unavailability of inputs 5. High cost of inputs 6. Poor roads 7. Problems with pests and diseases 8. Lack of water 9. Praedial larceny 10. Other (specify)
2					
3					
4					
74					

10. WHAT CHANGES WOULD YOU LIKE TO MAKE ON YOUR FARM WITHIN THE NEXT TWO YEARS?

Expand acreage under tree crops=1 Expand acreage under cash crops=2

Increase the number of livestock=3 Increase acreage under pasture=4

Reduce acreage under _____ to increase acreage under _____=5

Other(specify)=6 _____

11. WHAT DETERMINES HOW YOU USE THE LAND?

Good market price=1 Knowledge of crop=2 Operation not labour intensive=3 Constant cash flow=4

Low maintenance cost=5 Finance=6 Other=7 _____

12. DO YOU HAVE ANY LAND THAT IS NOT BEING USED NOW THAT IS SUITABLE FOR TREE CROPS?

Yes=1 No=2 If yes, which tree crops? _____

13. a) DO YOU INTEND TO PUT IN ANY OF THESE CROPS? Yes=1 No=2

If yes, which tree crops? -----

b) WHY DO YOU PREFER THESE TREES?

Would give shade to other plants=1 Able to manage the crop=2 Know about the crop=3

Operations not labour intensive=4 Other(specify)=5 -----

c) IF NO, WHY NOT? -----

d) HOW DO YOU INTEND TO PAY FOR IT?

Own Money=1 Partner=2 Commodity Board=3 P.C. Bank=4 Family=5 Sell Livestock=6 Friend=7

TREE CROP DATA

14. WHAT TREES DO YOU USE FOR THE FOLLOWING:

USES	NAMES OF TREES						
	CODES		CODES		CODES		CODES
1. Fire Wood							
2. Charcoal							
3. Yaa sticks							
4. Lumber							
5. Fencing							
6. Buildings							
7. Furniture							
8. Other(specify)							

15. HAVE YOU PLANTED ANY OF THESE TREES SINCE LAST YEAR?
(January-December 1989) Yes=1 No=2

16. (a). HAVE YOU EVER PLANTED ANY TREE CROPS? Yes=1 No=2
 (b). IF YES, HOW DO YOU PLANT IT.

(a)		(b)				
TREE/S	CODE	ACTIVITIES				
		Land Preparation	Lining / Spacing	Mole Digging	Moulding	Planting Depth

CULTURAL PRACTICES

17. WHICH CROPS DO YOU ALWAYS PLANT THAT GROW WELL TOGETHER?

18. HOW OFTEN DO YOU PLOUGH OR FORK LAND TO PLANT CASH CROPS?
 ----- (times per year)

19. WHICH CROPS DO YOU PRUNE AND HOW OFTEN?

(a)		(b)	
CROPS	CODE	FREQUENCY	CODES
			Once/Season-1
			Twice/Season-2
			Thrice/Season-3
			Four x/Season-4
			Five x/Season-5

FERTILIZER USE

20. WHAT TYPES OF FERTILIZER DO YOU USE ON THE FOLLOWING CROPS?

(a)		(b)	(c)	(d)	(e)				
CROPS	CODE	TYPES OF FERTILIZER							
		Inorganic			Organic				
		Mthd of Applctn	Code	Frqncy	Code	Mthd of Applctn	Code	Frqncy	Code

Application Codes: Broadcast=1 Band=2

PESTS / DISEASES

21. A) WHAT ARE YOUR MAJOR PEST AND DISEASE PROBLEMS?
 B) HOW DO YOU CONTROL THEM?

(a)		(b)	(c)	(d)	(e)	(f)	(g)
Name of Crops	Code	Pests	Control	Method of Application	Diseases	Control	Method of Application

Types of Control: Chemical-1
 Local-2

Means of Applctn: Knapsack-
 Sprayer-1
 Mist Blower-2
 Broadcasting-3
 Other (Specify)=4 _____

LABOUR UTILIZATION

22. HOW MANY PEOPLE DO YOU HIRE?

(a)	(b)	(c)		(d)	(e)	(f)					
Activities	TYPE OF LABOUR										
	Code	Hired								Other	Rates (\$)
		Family		Regular			Part-Time				
		H	F	H	F	Months	H	F	Mth/By		
Land Preparation											
Fertilizing											
Planting											
Weeding											
Spraying											
Pruning											
Reaping											
Marketing											
Tending Livestock											
Other (specify) -----											

Season/Month 1-Jan 2-Feb 3-Mar 4-Apr 5-May 6-Jne 7-Jly 8-Aug 9-Spt 10-Oct 11-Nov 12-Dec

23. HOW WOULD YOU REGARD THE AVAILABILITY OF LABOUR IN THIS AREA?

Readily Available=1 Available but Expensive=2 Available Periodically=3 Difficult to Obtain=4

Unavailable=5 Other(specify)=6_-----

24. HOW MUCH DID YOU SPEND ON THE FARM DURING JAN-JUNE 1990?

	(a)		(b)
Codes	Activities	Unit	Expenditure / \$
1	Planting Materials		
2	Fertilizer		
3	Chemicals		
	<u>Labour</u>		
4	Land Preparation		
5	Planting		
6	Weeding		
7	Spraying / Fertilizing		
8	Pruning		
9	Reaping		
10	Handling / Trnsptn		
11	Market Fees		
12	Livestock		
	TOTAL		

GROSS INCOME

**25. HOW MUCH DID YOU EARN FROM CROPS AND LIVESTOCK DURING
JANUARY-JUNE 1990?**

(a)		(b)	
Crops	Code	Unit	Total Value (\$)
Type of Livestock			
Off Farm Income			
Wages / Salaries			
Other		TOTAL	

MARKETING / STORAGE AND HANDLING

26. WHAT ARE THE MAJOR MARKETING PROBLEMS?

(a)	(b)
Crop Name	Marketing Problem Code

Code for Marketing Problems:

Low Prices=1 Lack of Transportation=2 Bad Roads=3
 Spoilage or Damage=4 Lack of Labour for Harvesting=5
 Rejection Due to Pests and Diseases=6 Low Demand=7
 Other(specify)=8

27. DID YOU LOOSE ANY OF YOUR CROPS IN 1989?

Crops	Code	Time of Loss		Reason Codes	
		Before Maturity	After Maturity		
			In field		In storage
				Birds 1	
				Pest / Disease 2	
				Incorrect Spraying / Use of Chemicals 3	
				Praedial Larceny 4	
				Other(specify)5	

SAVINGS GENERATION AND USE

28. DO YOU SAVE? Yes=1 No=2

28.(b) If yes, on what activities do you spend your savings?

Household=1 Farm=2 Recreation=3 Other(specify)=4

CREDIT UTILIZATION

29. DO YOU BORROW MONEY TO DO FARMING? YES=1 NO=2

(a)	Date of Last Loan	(b) Purpose	(c) Amount	(d) Type of Collateral Offered
Sources				

C O D E S

- | | | | |
|-----------------------|------|---|-----|
| <u>Sources</u> | | <u>Purpose</u> | |
| PC Bank | = 1 | Purchasing Planting Material | = 1 |
| AC Bank | = 2 | Purchase/Rent Farm Machinery/Tools | = 2 |
| Commercial Bank | = 3 | Purchase Farm Inputs (fertilizer, seeds, etc) | = 3 |
| Commodity Boards | = 4 | Purchase Livestock | = 4 |
| Local Shop Keeper | = 5 | Improve Pasture Fencing/Buildings | = 5 |
| Higgler | = 6 | Land Preparation | = 6 |
| Family | = 7 | Soil Conservation | = 7 |
| Friends | = 8 | Labour | = 8 |
| Off-farm Employment | = 9 | Other (Specify) | = 9 |
| Sell Livestock | = 10 | | |

29 (b). If no, what difficulty do you experience when seeking a loan?

Lack of Collateral=1 Lack of Guarantors=2 Registers Title but Joint Ownership=3

Repayments too High=4

33. WHY DO YOU STAY IN FARMING? _____

34.(a) Would you encourage any of your children to do farming?

Yes=1

No=2

(b) If no, why not?

Poor Returns=1 Poor living conditions=2 It is too hard=3 Other(specify)=4 _____

ATTITUDES / PERCEPTIONS

35. WOULD YOU BE WILLING TO ADOPT NEW WAYS OF DOING THINGS

ON YOUR FARM? Yes=1 No=2

If no, why _____

If yes, why _____

36.(a) HAVE YOU EVER ACTED ON ADVICE GIVEN BY EXTENSION OFFICERS?

Yes=1 No=2

(b) If no, why not? _____

(c) If yes, what are some of the things you disagree with?

37(a). DO YOU THINK THAT YOU ARE LOOSING SOIL ON YOUR FARM? Yes=1 No=2

(b). If yes, what are some of the things you notice?

Soil is less fertile=1 More stone is visible=2 Land taken over by gullies=3

Other(specify)=4 _____

(c). WHAT HAVE YOU DONE TO PREVENT THIS? _____

Put In: Contour Barriers=1 Trenches=2 Terraces=3 Plant Tree Crops=4 Other(specify)=5 _____

38. WHAT DO YOU DO ABOUT HOUSEHOLD GARBAGE?

Use as manure=1 Dump in the gully=2 Bury it=3 Throw in garbage heap=4 Other(specify)=5 _____

SOCIAL SITUATION

39. (a) WHERE DO YOU GET INFORMATION ON AGRICULTURE?
 (b) WHICH TYPES OF INFORMATION ARE MOST IMPORTANT TO YOU?

(a)		(b)			
Source	Tick	Importance of Information			
Radio			Very Important	Scarcely Important	Irrelevant
TV		Information on Prices			
Extension Officer		Information on New Technology			
JAS		Information on New Projects			
Friends / Relations		Information on Markets			
Newspaper		Information on Food Preservation			
McDonald Almanac		Information on New Storage Methods			
Farmer Training					
Other(specify) -----					

40. HOUSING FACILITIES

(a)	(b)	(c)	(d)	(e)
Tenure	Main Types of Building Materials	No. of Rooms	Main Toilet Facilities	Source of Lighting

Tenure Codes: Owned=1 Rented=2 Leased=3 Rent-Free=4 Other=5

Building Materials Codes: Block & Steel=1 Reinforced Concrete=2 Board Only=3 Nog=4 Zinc & Aluminum=5

Toilet Facility Codes: Flush=1 Pit Latrine=2 Bush=3 Other(specify)=4

Lighting Codes: Electricity=1 Kerosene=2 Delco=3 None=4 Other(specify)=5

41. WHERE DO YOU GET WATER TO DO THE FOLLOWING ACTIVITIES? (tick)

(a)		(b)	(c)	(d)	(e)	(f)
Source	Code	Household			Farm	
		Drinking	Washing	Bathing	Plants	Animals
Rain Water						
River						
Spring						
Well						
Pond						
Stand Pipe						
Domestic Piped Water						
Other (specify) -----						

42. WHAT TYPE OF FUEL DO YOU USE FOR COOKING PURPOSES?

Type of Fuel	Code	Tick
Wood	1	
Charcoal	2	
Cooking gas	3	
Kerosene	4	
Other (specify) 5 -----		

ASSETS

43. DO YOU OWN ANY OF THE FOLLOWING? (tick where appropriate)

Radio		Tank	
Television		Refridgerator	
Bicycle		Motor Vehicle	
Motorcycle			

FARMER ORGANISATIONS

44. ARE YOU A MEMBER OF ANY OF THESE ORGANISATIONS?

(a)	(b)	(c)	(d)	(e)	
Organisation	Membership	Responsibility	Duration of Membership	Reason for Membership	Reason for Membership Codes
Cocoa Coop					Access Inputs=1
Coffee Coop					Access Credit=2
Citrus Growers Assn.					Obtain Advice=3
Coconut Growers Assn.					Obtain Market=4
Jamaica Agric. Sec.					Obtain Information=5
Jamaica Livestck Assn.					Other (specify)=6
P.C. Bank					-----
AIBSA					
St. Catherine Vgtble Producers Assn.					
Other (specify) -----					

HEALTH CONDITION

45. WHAT TYPE OF ILLNESS DID YOU OR ANY MEMBER OF YOUR FAMILY SUFFER LAST YEAR? (1989)

(a)	(b)	(c)	(d)	(e)	(f)	
Illness	Number of Family Suffering				Frequency	Frequency Codes
	Adult		Children			
	M	F	Sex	Age		
1.						Once=1
2.						Twice=2
3.						Three times=3
4.						More than three times=4
5.						
6.						

46. WHAT FACILITIES DID YOU OR ANY OF YOUR FAMILY USE FOR THE TREATMENT OF THESE ILLNESSES?

(a)		(b)					
Type of Facility	Code	Number of Visits				Cost / Visit (\$)	
		Adults		Children			
		Sex	Age	Sex	Age		
Home Remedies=1							
Public Clinic=2							
Private Doctor=3							
Hospital Private=4							
Hospital Public=5							
Herbalist=6							
Private Dentist=7							

THANK YOU VERY MUCH FOR
YOUR COOPERATION !!

Interviewer's Signature _____

Date _____

Supervisor's Signature _____

Date _____

APPENDIX IV: FREQUENCY DISTRIBUTION OF BASELINE SURVEY QUESTIONS**TABLE 1: FREQUENCY DISTRIBUTION FOR GENDER OF FARMERS**

SEX	FREQUENCY	PERCENT
Female	74	27.1
Male	199	72.9
TOTALS	213	100.0

TABLE 2: FREQUENCY DISTRIBUTION FOR AGE OF FARMERS

AGE (YEARS)	FREQUENCY	PERCENT
20 - 29	23	8.4
30 - 39	36	13.2
40 - 49	39	14.3
50 - 59	57	20.9
60 - 69	60	22.0
70 - 79	48	17.5
80 - 89	10	3.7
TOTALS	273	100.0

TABLE 3: FREQUENCY DISTRIBUTION FOR LENGTH OF RESIDENCE

RESIDENCE (YEARS)	FREQUENCY	PERCENT
1 - 9	29	10.6
10 - 19	23	8.4
20 - 29	42	15.4
30 - 39	45	16.5
40 - 49	41	15.0
50 - 59	35	12.8
60 - 69	30	11.0
70 - 79	19	7.0
80 - 89	3	1.1
Missing values	6	2.2
TOTALS	273	100.0

TABLE 4: FREQUENCY DISTRIBUTION FOR NUMBER OF PARCELS PER FARMER

NO. OF PARCELS	FREQUENCY	PERCENT
1	140	51.2
2	51	18.7
3	40	14.7
4	12	4.4
5	4	1.5
Missing values	26	9.5
TOTALS	273	100.0

TABLE 5: FREQUENCY DISTRIBUTION FOR TOTAL FARM SIZE PER FARMER

CLASS	TOTAL FARM SIZE (ha)	FREQUENCY	PERCENT
Tiny	0 < 0.9	64	23.4
Small	0.9 < 2.3	86	31.6
Medium	2.3 < 4.5	61	22.3
Large	> 4.5	36	13.2
Missing Values		26	9.5
TOTALS		273	100.0

TABLE 6: NUMBER OF FARMERS WANTING TO MAKE CHANGES ON THEIR FARMS WITHIN TWO YEARS BY GENDER (Q.10)

CHANGES	MALE	FEMALE	FREQUENCY	PERCENT
Expand area under tree crops	155	56	211	77.3
Expand area under cash crops	24	8	32	11.7
Increase number of livestock	11	1	12	4.4
Rehabilitate cocoa/pimento	2	3	5	1.8
Upgrade tank for fencing	1	0	1	0.4
No plans	2	2	4	1.5
Clean up farm	0	2	2	0.7
Increase area under banana	0	1	1	0.4
Missing values	4	1	5	1.8
TOTALS	199	74	273	100.0

TABLE 7: NUMBER OF FARMERS WANTING TO MAKE CHANGES BY FARMS SIZE (Q.10)

CHANGES	FARM SIZE (Hectares)				TOTAL FARMERS	% OF SAMPLE
	< 1	1 < 2	2 < 4	4 >		
Expand area under tree crops	74	63	48	26	211	78
Expand area under cash crops	12	4	6	1	32	12
Increase number of livestock	6	3	1	2	12	4
Rehabilitate crops	3	1	0	0	5	2
Other	2	1	2	1	6	2
No change	3	2	0	0	5	2
TOTALS	100	84	57	30	271	100

TABLE 8: FREQUENCY DISTRIBUTION FOR TREE PLANTING ACTIVITIES (Q.16)

PLANT TREES	FREQUENCY	PERCENT
YES	240	87.9
NO	31	11.4
Missing values	2	0.7
TOTALS	273	100.0

TABLE 9: FREQUENCY DISTRIBUTION FOR FORKING LAND FOR CASH CROPS (Q.18)

NO. OF TIMES PER YEAR	FREQUENCY	PERCENT
0.5	2	0.7
1	120	44.0
2	67	24.5
3	17	6.2
4	10	3.7
8	1	0.4
Often	2	0.7
Missing values	54	19.8
TOTALS	273	100.0

TABLE 10: FREQUENCY DISTRIBUTION OF CROPS PRUNED (Q.19)

CROP	FARM SIZE							
	TINY		SMALL		LARGE		MEDIUM	
	Mean	Number	Mean	Number	Mean	Number	Mean	Number
Banana	3.6	8	3.9	11	4.8	13	4.6	7
Cocoa	3.2	34	2.7	53	2.9	40	2.7	26
Coffee	3.1	18	2.1	27	2.3	22	2.2	12
Orange	2.0	6	1.5	4	5.5	4	2.8	8
Overall Mean Pruning Freq. (times / year)	3.1		2.6		3.2		2.8	

TABLE 11: MEAN FREQUENCY OF PRUNING TREE CROPS BY AGE (Q.19)

CROP	AGE													
	20-29		30-39		40-49		50-59		60-69		70-79		80-89	
	Mean	No	Mean	No	Mean	No	Mean	No	Mean	No	Mean	No	Mean	No
Banana	3.1	4	4.7	3	3.0	2	3.4	10	4.3	10	4.8	10	4.0	3
Cocoa	2.3	10	3.4	17	2.8	27	2.5	34	2.7	39	3.5	34	3.4	10
Coffee	2.0	2	3.4	12	2.3	16	2.5	14	1.9	18	2.3	18	2.1	7
Orange	2.0	2	4.5	6	3.5	4	2.5	4	4.0	4	3.0	3	0	0
Overall Pruning Freq. (#/year)	2.4		3.7		2.7		2.6		2.8		3.3		3.0	

TABLE 12: FREQUENCY DISTRIBUTION OF FERTILISER PRACTICES BY CROP (Q.20)

CROPS	FREQUENCY	PERCENT
Cocoa	87	18.2
Coffee	63	13.2
Citrus	26	5.4
Coconut	33	6.9
Banana	76	15.9
Plantain	37	7.7
Breadfruit	1	0.2
Ackee	1	0.2
Pimento	2	0.4
Mango	1	0.2
Rock Sweet-wood	1	0.2
Mahogany	1	0.2
Hog plum	1	0.2
Yam	32	6.7
Tomato	23	4.8
Cabbage	15	3.1
Eating cane	11	2.3
Sugar cane	5	1.0
Red pea	10	2.1
Gungo pea	2	0.4
Corn	5	1.0
Irish potato	2	0.4
Sweet potato	1	0.2
Cassava	2	0.4
Sweet pepper	2	0.4
Turnip	1	0.2
Carrot	4	0.8
Cucumber	3	0.6

TABLE 13: MEAN NUMBER OF LABOURERS WORKING FOR FARMERS BETWEEN JANUARY AND AUGUST

TYPE OF LABOUR	MALE		FEMALE		PROBABILITY
	MEAN	SE	MEAN	SE	
Total	9	0.3	8	0.5	0.05
Family	8	0.6	7	0.7	0.26
Hired	6	0.3	4	0.3	0.01
Male	8	0.3	7	0.5	0.03
Female	3	0.2	2	0.2	0.01

TABLE 14: FREQUENCY DISTRIBUTION FOR BORROWING MONEY TO FARM (Q.29)

BORROW MONEY	FREQUENCY	PERCENT
YES	53	19.4
NO	215	78.8
Missing values	5	1.8
TOTALS:	273	100.0

TABLE 15: SOURCE OF LOAN FOR FARMERS BORROWING MONEY

TYPE OF LOAN INSTITUTION	LOAN SOURCE	FREQUENCY	PERCENT
Formal	P. C. Bank	36	64.3
Formal	Commodity Board	3	5.4
Formal	Commercial Bank	1	1.8
Informal	Friends	8	14.3
Informal	Family	7	12.5
Informal	Employer	1	1.8
TOTAL		56	100.0

TABLE 16: PURPOSE FOR BORROWING MONEY TO FARM

PURPOSE OF LOAN	FREQUENCY	PERCENT
Purchase plants	35	62.5
Purchase livestock	6	10.7
Pay for land preparation	6	10.7
Purchase inputs	5	8.9
Pay for farm labour	3	5.4
Purchase tools	1	1.8
TOTAL	56	100.0

TABLE 17: TYPE OF COLLATERAL OFFERED TO SECURE A LOAN

COLLATERAL	FREQUENCY	PERCENT
None	25	43.9
Land title	17	29.9
Livestock	1	1.7
Guarantor	1	1.7
Missing values	12	22.8
TOTAL	56	100.0

TABLE 18: FREQUENCY DISTRIBUTION FOR DIFFICULTY IN BORROWING MONEY TO FARM (Q.29B)

REASON GIVEN	FREQUENCY	PERCENT
Lack of collateral	6	2.2
Lack guarantor	4	1.5
Joint title	7	2.6
High payments	2	0.7
Crop not there	1	0.4
Not enough money	1	0.4
Age	1	0.4
Never sought	150	54.9
Don't understand	1	0.4
Don't like to borrow	1	0.4
Missing values	99	36.3
TOTAL	273	100.0

TABLE 19: FARMERS WILLINGNESS TO ADOPT NEW FARMING METHODS (Q.35A)

RESPONSE	MALE	FEMALE	FREQUENCY	PERCENT
YES	197	68	265	97.1
NO	1	6	7	2.5
Missing Values	1	0	1	0.4
TOTAL	199	74	273	100.0

TABLE 20: FREQUENCY DISTRIBUTION FOR ACTING ON EXTENSION ADVICE (Q.36A)

ACT ON EXTENSION	FREQUENCY	PERCENT
YES	109	39.9
NO	148	54.2
Missing values	16	5.9
TOTALS:	273	100.0

TABLE 21: FREQUENCY DISTRIBUTION FOR REASON NOT TO ACT ON EXTENSION ADVICE (Q.36B)

REASON GIVEN	FREQUENCY	PERCENT
Suggestion not sensible	2	0.7
No confidence in advice	1	0.4
Access to knowledge/training	1	11.0
Obtained no advice	30	38.5
No extension visit	105	49.1
Missing values	134	
TOTALS:	273	100.0

TABLE 22: FREQUENCY DISTRIBUTION FOR DISAGREEING WITH EXTENSION ADVICE (Q.36C)

REASON GIVEN	FREQUENCY	PERCENT
Spraying coffee while bearing	1	0.4
Cleaning cocoa without Government assistance	1	0.4
Lining of plants	1	0.4
Planting of bananas	1	0.4
Naming of insects	4	1.5
Removal of sword sucker	1	0.4
No disagreement	83	30.4
Lateness of extension officer	1	0.4
Missing values	180	65.9
TOTALS:	273	100.0

TABLE 23: FREQUENCY DISTRIBUTION FOR NOTICING SOIL LOSS ON FARM (Q.37A)

NOTICE SOIL LOSS	FREQUENCY	PERCENT
YES	178	65.2
NO	88	32.2
Missing values	7	2.6
TOTALS:	273	100.0

APPENDIX V: ANALYSIS TABLES FOR THE BASELINE SURVEY

TABLE 1 : FARMERS PLANS FOR MAKING CHANGES ON THEIR FARMS BY AGE (Q10)

CHANGES	AGE CLASS (YEARS)							TOTAL
	20-29	30-39	40-49	50-59	60-69	70-79	80-89	
Tree crop	18 (81.82%)	27 (79.41%)	34 (87.18%)	39 (68.42%)	53 (89.83%)	32 (69.57%)	7 (70.00%)	210 (78.65%)
Cash crop	2 (9.09%)	4 (11.76%)	1 (2.56%)	12 (21.05%)	4 (6.78%)	9 (19.57%)	0	32 (11.99%)
Livestock	1 (4.55%)	2 (5.88%)	3 (7.69%)	3 (5.26%)	1 (1.69%)	1 (2.17%)	1 (10.00%)	12 (4.49%)
Cocoa/ Pimento	1 (4.55%)	1 (2.94%)	1 (2.56%)	2 (3.51%)	0	0	0	5 (1.87%)
Tank/fence	0	0	0	1 (1.75%)	0	0	0	1 (.37%)
No plan	0	0	0	0	1 (1.69%)	2 (4.35%)	1 (10.00)	4 (1.50%)
Clean farm	0	0	0	0	0	2 (4.35%)	0	2 (.57%)
Banana	0	0	0	0	0	0	1	1
TOTAL	22 (100.00%)	34 (100.00%)	39 (100.00%)	57 (100.00%)	59 (100.00%)	46 (100.00%)	10 (100.00%)	267

Statistic	DF	Value	Prob
Pearsons chi-squared test	42	70.44	0.0039*

TABLE 2 : FARMERS PLANS FOR MAKING CHANGES ON THEIR FARMS BY GENDER (Q10)

SEX			
CHANGES	MALE	FEMALE	TOTAL
Tree crop	155 (79.49%)	56 (76.71%)	211 (78.73%)
Cash crop	24 (12.31%)	8 (10.96%)	32 (11.94%)
Livestock	11 (5.64%)	1 (1.37%)	12 (4.48%)
Cocoa/ Pimento	2 (1.03%)	3 (4.11%)	5 (1.87%)
Tank/fence	1 (.51%)	0	1 (.37%)
No plan	2 (1.03%)	2 (2.74%)	4 (1.49%)
Clean farm	0	2 (2.74%)	2 (.75%)
Banana	0	1 (1.37%)	1 (.37%)
TOTAL	195 (100.00%)	73 (100.00%)	268

Statistic	DF	Value	Prob
Pearsons chi-squared test	7	14.44	0.0439*

TABLE 3 : FARMERS PLANS FOR MAKING CHANGES ON THEIR FARMS BY FARMSIZE (Q10)

FARMSIZE					
CHANGES	TINY	SMALL	MEDIUM	LARGE	TOTAL
Tree crop	74 (73.27%)	63 (85.14%)	48 (84.21%)	26 (86.67%)	211 (80.53%)
Cash crop	12 (11.88%)	4 (5.41%)	6 (10.53%)	1 (3.33%)	23 (8.78%)
Livestock	6 (5.94%)	3 (4.05%)	1 (1.75%)	2 (6.67%)	12 (4.58%)
Cocoa/ Pimento	4 (3.96%)	1 (1.35%)	0	0	5 (1.91%)
Other	2 (1.98%)	1 (1.35%)	2 (3.51%)	1 (3.33%)	6 (2.29%)
No plans	3 (2.97%)	2 (2.70%)	0	0	5 (1.91%)
TOTAL	101 (100.00%)	74 (100.00%)	57 (100.00%)	30 (100.00%)	262

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	13.45	0.5674

TABLE 4 : FACTORS DETERMINING LANDUSE BY AGE (Q11)

REASONS	AGE CLASS (YEARS)							TOTAL
	20-29	30-39	40-49	50-59	60-69	70-79	80-89	
Cash flow	9 (40.91%)	9 (26.47%)	10 (25.00%)	26 (45.61%)	22 (36.67%)	16 (33.33%)	1 (10.00%)	93 (34.32%)
Finance	5 (22.73%)	7 (20.59%)	9 (22.50%)	10 (17.54%)	14 (23.33%)	11 (22.92%)	3 (30.00%)	59 (21.77%)
Knowledge	1 (4.55%)	5 (14.71%)	7 (17.50%)	7 (12.28%)	5 (8.33%)	4 (8.33%)	2 (20.00)	31 (11.44%)
Not labor Intensive	3 (13.64%)	4 (11.76%)	4 (10.00%)	4 (7.02%)	8 (13.33%)	8 (16.67%)	1 (10.00%)	22 (11.44%)
Good price	4 (18.18%)	3 (8.82%)	6 (15.00%)	5 (8.77%)	4 (6.67%)	6 (12.50)	2 (20.00%)	30 (11.07)
Low cost	0	1 (2.94%)	2 (5.00%)	2 (3.51%)	3 (5.00%)	1 (2.08%)	0	9 (3.32%)
Other	0	5 (14.71%)	2 (5.00%)	3 (5.26%)	4 (6.67%)	2 (4.17)	1 (10.00%)	17 (6.27%)
TOTAL	22 (100.00%)	34 (100.00%)	40 (100.00%)	57 (100.00%)	60 (100.00%)	48 (100.00)	10 (100.00)	271 (100.00)

Statistic	DF	Value	Prob
Pearsons chi-squared test	36	25.27	0.9095

TABLE 5 : FACTORS DETERMINING LANDUSE BY GENDER (Q11)

SEX			
REASON	MALE	FEMALE	TOTAL
Cash flow	62 (32.63%)	31 (42.47%)	93 (35.36%)
Finance	43 (22.63%)	17 (23.29%)	60 (22.81%)
Knowledge	21 (11.05%)	11 (15.07%)	32 (12.17%)
Not labor Intensive	25 (13.16%)	7 (9.59%)	32 (12.17%)
Good price	20 (10.53%)	4 (5.48%)	24 (9.13%)
Low cost	9 (4.74%)	0	9 (3.42%)
Other	10 (5.26%)	3 (4.11%)	13 (4.94%)
TOTAL	190 (100.00%)	73 (100.00%)	263

Statistic	DF	Value	Prob
Pearsons chi-squared test	6	7.775	0.2550

TABLE 6 : FACTORS DETERMINING LANDUSE BY FARMSIZE (Q11)

FARMSIZE					
REASONS	TINY	SMALL	MEDIUM	LARGE	TOTAL
Cash flow	30 (30.00%)	34 (40.48%)	22 (38.60%)	7 (23.33%)	93 (34.32%)
Finance	23 (23.00%)	17 (20.24%)	11 (19.30%)	9 (30.00%)	60 (22.14%)
Knowledge	10 (10.00%)	10 (11.90%)	6 (10.53%)	5 (16.67%)	31 (11.44%)
Not labor Intensive	14 (14.00%)	9 (10.71%)	7 (12.28%)	2 (6.67%)	32 (11.81%)
Good price	9 (9.00%)	4 (4.76%)	6 (10.53%)	6 (20.00%)	25 (9.23%)
Other	14 (14.00%)	10 (11.90%)	5 (8.77%)	1 (3.33%)	30 (11.07%)
TOTAL	100 (100.00%)	84 (100.00%)	57 (100.00%)	30 (100.00%)	271

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	14.60	0.4808

TABLE 7 : DIFFERENCES IN ROW SPACING FOR TREE CROPS (Q16)

SPACING	TREE CROP								
	COCOA	COFFEE	CITRUS	COCOMUT	CEDAR	AVOCADO	BANANA	MANGO	TOTAL
IRREGULAR	49 (48.04%)	32 (43.24%)	9 (60.00%)	25 (37.88%)	11 (32.35%)	15 (75.00%)	2 (25.00%)	13 (81.25%)	156 (46.57%)
<0.9	5 (4.90%)	2 (2.70%)	0	1 (1.52%)	1 (2.94%)	0	1 (12.00%)	0	10 (2.99%)
0.9-2.3	4 (3.92%)	12 (16.22%)	1 (6.67%)	3 (4.55%)	2 (5.88%)	0	3 (37.50%)	0	25 (7.46%)
2.4-3.5	30 (29.41%)	22 (29.73%)	5 (33.33%)	11 (16.67%)	8 (23.53%)	1 (5.00%)	1 (12.50%)	1 (6.25%)	79 (23.58%)
3.6-5.3	9 (8.82%)	3 (4.05%)	0	7 (10.61%)	1 (2.94%)	0	1 (12.50%)	2 (12.50%)	23 (6.87%)
5.4-5.9	1 (.98%)	1 (1.35%)	0	5 (7.58%)	0	1 (5.00%)	0	0	8 (2.39%)
>6	4 (3.92%)	2 (2.70%)	0	14 (21.21%)	11 (32.35%)	3 (15.00%)	0	0	34 (10.00%)
TOTAL	102 (100.00%)	74 (100.00%)	15 (100.00%)	66 (100.00%)	34 (100.00%)	20 (100.00%)	8 (100.00%)	16 (100.00%)	335

Statistic	DF	Value	Prob
Pearsons chi-squared test	42	104.8	0.0001

TABLE 8 : DIFFERENCES IN PLANTING DEPTH FOR TREE CROPS (Q16)

TREE CROP									
DEPTH (cm)	COCOA	COFFEE	CITRUS	COCONUT	CEDAR	AVOCADO	BANANA	MANGO	TOTAL
IRREGULAR	20 (16.53%)	13 (16.88%)	2 (12.50%)	14 (16.87%)	4 (8.51%)	10 (45.455)	1 (10.00%)	7 (35.00%)	71 (17.00%)
<10	15 (12.40%)	6 (7.79%)	2 (12.50%)	7 (8.43%)	2 (4.26%)	3 (13.64%)	0	2 (10.00%)	37 (9.34%)
10-20	24 (19.83%)	12 (15.58%)	2 (12.50%)	6 (7.23%)	17 (36.17%)	3 (13.64%)	1 (10.00%)	2 (10.00%)	67 (16.92%)
20-30	22 (18.18%)	16 (20.78%)	2 (12.50%)	4 (4.82%)	9 (19.15%)	1 (4.55%)	0	3 (15.00%)	57 (14.39%)
30-40	15 (12.40%)	15 (19.48%)	6 (37.50%)	23 (27.71%)	14 (29.79%)	4 (18.18%)	3 (30.00%)	4 (20.00%)	84 (21.21%)
40-60	23 (19.01%)	14 (18.18%)	1 (6.25%)	19 (22.89%)	0	0	1 (10.00%)	1 (5.00%)	59 (14.90%)
60+	2 (1.65%)	1 (1.30%)	1 (6.25%)	10 (12.05%)	1 (2.13%)	1 (4.55%)	4 (40.00%)	1 (5.00%)	21 (5.30%)
TOTAL	121 (100.00%)	77 (100.00%)	16 (100.00%)	83 (100.00%)	47 (100.00%)	22 (100.00%)	10 (100.00%)	20 (100.00%)	396

Statistic	DF	Value	Prob
Pearsons chi-squared test	42	113.7	0.0001**

TABLE 9 : DIFFERENCES IN MOULDING TREE CROPS WHEN PLANTING (Q16)

TREES	MOULD	NO MOULD	TOTAL
Cocoa	51 (42.86%)	68 (57.14%)	119 (100.00%)
Coffee	35 (46.67%)	40 (53.33%)	75 (100.00%)
Citrus	9 (52.94%)	8 (47.06%)	17 (100.00%)
Coconut	26 (33.33%)	52 (66.67%)	78 (100.00%)
Cedar	10 (23.26%)	33 (76.74%)	43 (100.00%)
Avocado	14 (56.00%)	11 (44.00%)	25 (100.00%)
Banana	3 (30.00%)	7 (70.00%)	10 (100.00%)
Mango	11 (55.00%)	9 (45.00%)	20 (100.00%)
TOTAL	159 (41.09%)	228 (58.91%)	387

Statistic	DF	Value	Prob
Pearsons chi-squared test	7	14.10	0,0495*

TABLE 10 : MEAN FREQUENCY OF PRUNING TREE CROPS BY AGE (Q19)

TREE	AGE (YEARS)							TOTAL
	20-29	30-39	40-49	50-59	60-69	70-79	80-89	
Banana	3.1 (32.98%)	4.7 (29.38%)	30 (25.86%)	34 (31.19%)	43 (33.33%)	48 (35.29%)	40 (42.11%)	273 (32.54%)
Cocoa	2.3 (24.47%)	34 (21.25%)	28 (24.14%)	25 (22.94%)	27 (20.93%)	35 (25.74%)	34 (35.79%)	206 (24.55%)
Coffee	20 (21.28%)	34 (21.25%)	23 (19.83%)	25 (22.94%)	19 (14.73%)	23 (16.91%)	21 (22.11%)	165 (19.67%)
Orange	20 (21.28%)	45 (28.13%)	35 (30.17%)	25 (22.94%)	40 (31.01%)	30 (22.06%)	0	195 (23.24%)
TOTAL	94 (100.00%)	160 (100.00%)	116 (100.00%)	109 (100.00%)	129 (100.00%)	136 (100.00)	95 (100.00)	839

Statistic	DF	Value	Prob
Pearsons chi-squared test	18	44.69	0.0005**

TABLE 11 : MEAN FREQUENCY OF PRUNING TREE CROPS BY FARMSIZE (Q16)

TREE	FARMSIZE				
	TINY	SMALL	MEDIUM	LARGE	TOTAL
Banana	36 (30.25%)	39 (38.24%)	48 (30.97%)	46 (37.40%)	169 (33.87%)
Cocoa	32 (26.89%)	27 (26.47%)	29 (18.71%)	27 (21.95%)	115 (23.05%)
Coffee	31 (26.05%)	21 (20.59%)	23 (14.84%)	22 (17.89%)	97 (19.44%)
Orange	20 (16.81%)	15 (14.71%)	55 (35.48%)	28 (22.76%)	118 (23.65%)
TOTAL	119 (100.00%)	102 (100.00%)	155 (100.00%)	123 (100.00%)	499

Statistic	DF	Value	Prob
Pearsons chi-squared test	9	24.09	0.0042**

TABLE 12: DIFFERENCES IN FREQUENCY OF USING INORGANIC FERTILIZER BY TREE CROP (Q20)

TREE CROP								
FREQUENCY (#/YR)	COCOA	COFFEE	CITRUS	COCOM/T	BANANA	YAM	TOMATO	TOTAL
1	25 (35.71%)	18 (37.50%)	8 (34.78%)	7 (33.33%)	21 (37.50%)	8 (33.33%)	4 (23.53%)	91 (35.14%)
2	24 (34.29%)	16 (33.33%)	7 (30.43%)	8 (38.10%)	19 (33.93%)	12 (50.00%)	7 (41.18%)	93 (35.91%)
3	3 (4.29%)	5 (10.42%)	5 (21.74%)	2 (9.52%)	4 (7.14%)	0	1 (5.88%)	20 (7.72%)
4	14 (20.00%)	7 (14.58%)	2 (8.70%)	4 (19.05%)	10 (17.86%)	4 (16.67%)	3 (17.65%)	44 (16.99%)
6	1 (1.43%)	1 (2.08%)	1 (4.35%)	0	0	0	2 (11.76%)	5 (1.93%)
8	3 (4.29%)	1 (2.08%)	0	0	2 (3.57%)	0	0	6 (2.32%)
TOTAL	70 (100.00%)	48 (100.00%)	23 (100.00%)	21 (100.00%)	56 (100.00%)	24 (100.00%)	17 (100.00%)	259

Statistic	DF	Value	Prob
Pearsons chi-squared test	30	28.50	0.5438

TABLE 13 : DIFFERENCES IN INORGANIC FERTILIZER APPLICATION METHOD BY CROP (Q20)

APPLICATION METHOD			
CROPS	BROADCAST	BAND	TOTAL
Cocoa	37 (52.86%)	33 (47.14%)	70 (100.00%)
Coffee	22 (44.00%)	28 (56.00%)	50 (100.00%)
Citrus	8 (34.78%)	15 (65.22%)	23 (100.00%)
Coconut	5 (20.83%)	19 (79.17%)	24 (100.00%)
Banana	30 (52.63%)	27 (47.37%)	57 (100.00%)
Plantain	12 (48.00%)	13 (52.00%)	25 (100.00%)
Yam	17 (65.38%)	9 (34.62%)	26 (100.00%)
Tomato	3 (15.00%)	17 (85.00%)	20 (100.00%)
TOTAL	134 (45.42%)	161 (54.58%)	295

Statistic	DF	Value	Prob
Pearsons chi-squared test	7	21.41	0.0032**

TABLE 14 : DIFFERENCES IN ORGANIC FERTILIZER APPLICATION METHOD BY CROP (Q20)

APPLICATION METHOD			
CROPS	BROADCAST	BAND	TOTAL
Cocoa	14 (70.00%)	6 (30.00%)	20 (100.00%)
Coffee	9 (56.25%)	7 (43.75%)	16 (100.00%)
Citrus	3 (50.00%)	3 (50.00%)	6 (100.00%)
Coconut	7 (53.85%)	6 (46.15%)	13 (100.00%)
Banana	14 (63.64%)	8 (36.36%)	22 (100.00%)
Plantain	4 (50.00%)	4 (50.00%)	8 (100.00%)
Yam	7 (77.78%)	2 (22.22%)	9 (100.00%)
Tomato	1 (50.00%)	1 (50.00%)	2 (100.00%)
TOTAL	59 (61.46%)	37 (38.54%)	96

Statistic	DF	Value	Prob
Pearsons chi-squared test	7	3.06	0.8794

TABLE 15 : DIFFERENCES IN NUMBER OF FARMERS USING INORGANIC FERTILIZER BY AGE (Q20)

CROPS	AGE (YEARS)					TOTAL
	<30	30-39	40-49	50-59	>60	
Cocoa	5 (25.00%)	11 (25.00%)	10 (28.57%)	11 (26.19%)	34 (33.33%)	71 (29.22%)
Coffee	1 (5.00%)	11 (25.00%)	9 (25.71%)	9 (21.43%)	20 (19.61%)	50 (20.58%)
Citrus	1 (5.00%)	7 (15.91%)	3 (8.57%)	4 (9.52%)	26 (25.49%)	41 (16.87%)
Coconut	0	4 (9.09%)	5 (14.29%)	4 (9.52%)	9 (8.82%)	22 (9.05%)
Banana	7 (35.00%)	9 (20.45%)	5 (14.29%)	9 (21.43%)	9 (8.82%)	39 (16.05%)
Plantain	6 (30.00%)	2 (4.55%)	3 (8.57%)	5 (11.90%)	4 (3.92%)	20 (8.23%)
TOTAL	20 (100.00%)	44 (100.00%)	35 (100.00%)	42 (100.00%)	102 (100.00%)	243

Statistic	DF	Value	Prob
Pearsons chi-squared test	20	40.64	0.0041**

TABLE 16 : DIFFERENCES IN NUMBER OF FARMERS USING ORGANIC FERTILIZER BY AGE (Q20)

CROPS	AGE (YEARS)					TOTAL
	<30	30-39	40-49	50-59	>60	
Cocoa	1 (50.00%)	4 (33.33%)	3 (14.29%)	4 (25.00%)	7 (21.21%)	19 (22.62%)
Coffee	0	2 (16.67%)	6 (28.57%)	3 (18.75%)	5 (15.15%)	16 (19.05%)
Citrus	0	0	2 (9.52%)	1 (6.25%)	3 (9.09%)	6 (7.14%)
Coconut	0	2 (16.67%)	5 (23.81%)	1 (6.25%)	5 (15.15%)	13 (15.48%)
Banana	1 (50.00%)	4 (33.33%)	3 (14.29%)	5 (31.25%)	9 (27.27%)	22 (26.19%)
Plantain	0	0	2 (9.52%)	2 (12.50%)	4 (12.12%)	8 (9.52%)
TOTAL	2 (100.00%)	12 (100.00%)	21 (100.00%)	16 (100.00%)	33 (100.00%)	84

Statistic	DF	Value	Prob
Pearsons chi-squared test	20	10.86	0.9497

TABLE 17 : DIFFERENCES IN NUMBER OF FARMERS USING INORGANIC FERTILIZER BY FARMSIZE (Q20)

CROPS	FARMSIZE				
	TINY	SMALL	MEDIUM	LARGE	TOTAL
Cocoa	23 (27.71%)	18 (34.62%)	20 (29.41%)	10 (23.26%)	71 (28.86%)
Coffee	16 (19.28%)	8 (15.38%)	15 (22.06%)	11 (25.58%)	50 (20.33%)
Citrus	9 (10.84%)	1 (1.92%)	6 (8.82%)	6 (13.95%)	22 (8.94%)
Coconut	10 (12.05%)	3 (5.77%)	8 (11.76%)	3 (6.98%)	24 (9.76%)
Banana	17 (20.48%)	16 (30.77%)	13 (19.12%)	9 (20.93%)	55 (22.36%)
Plantain	8 (9.64%)	6 (11.54%)	6 (8.82%)	4 (9.30%)	24 (9.76%)
TOTAL	83 (100.00%)	52 (100.00%)	68 (100.00%)	43 (100.00%)	246

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	11.16	0.7409

TABLE 18: DIFFERENCES IN NUMBER OF FARMERS OF USING ORGANIC FERTILIZER BY FARMSIZE (2)

FARMSIZE					
CROPS	TINY	SMALL	MEDIUM	LARGE	TOTAL
Cocoa	5 (19.23%)	7 (22.58%)	5 (26.32%)	2 (25.00%)	19 (22.62%)
Coffee	3 (11.54%)	7 (22.58%)	3 (15.79%)	3 (37.50%)	16 (19.05%)
Citrus	3 (11.54%)	1 (3.23%)	2 (10.53%)	0	6 (7.14%)
Coconut	4 (15.38%)	4 (12.90%)	4 (21.05%)	1 (12.50%)	13 (15.48%)
Banana	7 (26.92%)	9 (29.03%)	4 (21.05%)	2 (25.00%)	22 (26.19%)
Plantain	4 (15.38%)	3 (9.68%)	1 (5.26%)	0	8 (9.52%)
TOTAL	26 (100.00%)	31 (100.00%)	19 (100.00%)	8 (100.00%)	84

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	7.94	0.9262

TABLE 19 : DIFFERENCES IN NUMBER OF FARMERS OBSERVING PEST PROBLEMS (Q21)

FARMERS' OBSERVATION			
CROPS	PEST	NO PEST	TOTAL
Cocoa	98 (48.76%)	103 (51.24%)	201 (100.00%)
Coffee	34 (30.36%)	78 (69.64%)	112 (100.00%)
Coconut	2 (1.77%)	111 (98.23%)	113 (100.00%)
Citrus	22 (37.93%)	36 (62.07%)	58 (100.00%)
Banana	37 (19.27%)	155 (80.73%)	192 (100.00%)
Plantain	17 (18.48%)	75 (81.52%)	92 (100.00%)
Mango	1 (3.45%)	28 (96.55%)	29 (100.00%)
Pimento	3 (6.67%)	42 (93.33%)	45 (100.00%)
Soursop	2 (22.22%)	7 (77.78%)	9 (100.00%)
Breadfruit	2 (2.25%)	87 (97.75%)	89 (100.00%)
Avocado	0	126 (100.00%)	126 (100.00%)
Ackee	1 (2.94%)	33 (97.06%)	34 (100.00%)
TOTAL	219 (19.91%)	881 (80.09%)	1100

Statistic	DF	Value	Prob
Pearsons chi-squared test	11	212.60	0.0001**

TABLE 20 : DIFFERENCES IN NUMBER OF FARMERS OBSERVING DISEASE PROBLEMS (Q21)

FARMERS' OBSERVATION

CROPS	DISEASE	NONE	TOTAL
Cocoa	44 (18.33%)	196 (81.67%)	240 (100.00%)
Coffee	10 (6.71%)	139 (93.29%)	149 (100.00%)
Coconut	7 (4.86%)	137 (95.14%)	144 (100.00%)
Citrus	3 (4.29%)	67 (95.71%)	70 (100.00%)
Banana	8 (3.38%)	229 (96.62%)	237 (100.00%)
Plantain	0	112 (100.00%)	112 (100.00%)
Mango	1 (2.00%)	49 (98.00%)	50 (100.00%)
Ackee	1 (2.22%)	44 (97.78%)	45 (100.00%)
Breadfruit	0	96 (100.00%)	96 (100.00%)
Soursop	0	15 (100.00%)	15 (100.00%)
Pimento	1 (1.52%)	65 (98.48%)	66 (100.00%)
Avocado	0	48 (100.00%)	48 (100.00%)
TOTAL	75 (5.90%)	1197 (94.10%)	1272

Statistic	DF	Value	Prob
Pearsons chi-squared test	11	92.13	0.0001**

TABLE 21 : DIFFERENCES IN NUMBER OF FARMERS WITH PEST PROBLEMS USING CONTROL METHODS

PEST PROBLEM			
CROPS	CONTROL	NONE	TOTAL
Cocoa	78 (61.42%)	49 (38.58%)	127 (100.00%)
Coffee	27 (72.97%)	10 (27.03%)	37 (100.00%)
Citrus	27 (100.00%)	0	27 (100.00%)
Banana	26 (60.47%)	17 (39.53%)	43 (100.00%)
Plantain	9 (60.00%)	6 (40.00%)	15 (100.00%)
TOTAL	167 (67.07%)	82 (32.93%)	249

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	16.87	0.0021**

TABLE 22 : DIFFERENCES IN NUMBER OF FARMERS USING DIFFERENT TYPES OF CONTROL METHODS FOR PESTS (Q21)

CONTROL METHOD			
CROPS	CHEMICAL	LOCAL	TOTAL
Cocoa	70 (89.74%)	8 (10.26%)	78 (100.00%)
Coffee	24 (88.89%)	3 (11.11%)	27 (100.00%)
Citrus	22 (81.48%)	5 (18.52%)	27 (100.00%)
Banana	16 (61.54%)	10 (38.46%)	26 (100.00%)
Plantain	3 (33.33%)	6 (66.67%)	9 (100.00%)
TOTAL	135 (80.84%)	32 (19.16%)	167

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	24.49	0.0001**

TABLE 23 : DIFFERENCES IN THE NUMBER OF FARMERS REPORTING MARKET PROBLEMS BY CROP (Q26)

PROBLEMS	CROP						
	COCOA	BANANA	PLANTAIN	PINEAPPLE	TOMATO	YAM	TOTAL
Price	0	55 (36.91%)	11 (44.00%)	2 (13.33%)	6 (28.57%)	4 (30.77%)	78 (32.10%)
Transport	6 (30.00%)	22 (14.77%)	7 (28.00%)	9 (60.00%)	2 (9.52%)	5 (38.46%)	51 (20.99%)
Roads	4 (20.00%)	5 (3.36%)	4 (16.00%)	0	1 (4.76%)	1 (7.69%)	15 (6.17%)
Spoilage	4 (20.00%)	32 (21.48%)	0	2 (13.33%)	4 (19.05%)	2 (15.38%)	44 (18.11%)
Labour	3 (15.00%)	0	0	0	0	0	3 (1.23%)
Pests	1 (5.00%)	0	0	0	2 (9.52%)	0	3 (1.23%)
Demand	1 (5.00%)	35 (23.49%)	3 (12.00%)	2 (13.33%)	6 (28.57%)	1 (7.69%)	48 (19.75%)
Larceny	1 (5.00%)	0	0	0	0	0	1 (.41%)
TOTAL	20 (100.00%)	149 (100.00%)	25 (100.00%)	15 (100.00%)	21 (100.00%)	13 (100.00%)	243

Statistic	DF	Value	Prob
Pearsons chi-squared test	35	114.5	0.0001**

TABLE 24 : DIFFERENCES IN THE NUMBER OF FARMERS BORROWING BY SOURCE OF CREDIT AND FARM SIZE (Q29)

FARMSIZE

SOURCE	TINY	SMALL	MEDIUM	LARGE	TOTAL
P.C. Bank	14 (60.87%)	5 (71.43%)	8 (57.14%)	10 (76.92%)	37 (64.91%)
Bank	0	0	0	1 (7.69%)	1 (1.75%)
Commodity Board	1 (4.35%)	1 (14.29%)	1 (7.14%)	0	3 (5.26%)
Family	4 (17.39%)	1 (14.29%)	1 (7.14%)	1 (7.69%)	7 (12.28%)
Friends	4 (17.39%)	0	4 (28.57%)	0	8 (14.04%)
Employer	0	0	0	1 (7.69%)	1 (1.75%)
TOTAL	23 (100.00%)	7 (100.00%)	14 (100.00%)	13 (100.00%)	57

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	15.32	0.4283

TABLE 25 : DIFFERENCES IN NUMBER OF FARMERS BORROWING BY TYPE OF CREDIT SOURCE AND FARM SIZE (29)

FARMSIZE					
SOURCE	TINY	SMALL	MEDIUM	LARGE	TOTAL
Formal	15 (65.22%)	6 (85.71%)	9 (64.29%)	11 (84.62%)	41 (71.93%)
Informal	8 (34.78%)	1 (14.29%)	5 (35.71%)	2 (15.38%)	16 (28.07%)
TOTAL	23 (100.00%)	7 (100.00%)	14 (100.00%)	13 (100.00%)	57

Statistic	DF	Value	Prob
Pearsons chi-squared test	3	2.613	0.4552

TABLE 26 : DIFFERENCES IN THE NUMBER OF FARMERS BORROWING BY SOURCE OF CREDIT AND GENDER (Q29)

SEX			
SOURCE	MALE	FEMALE	TOTAL
P.C. Bank	33 (68.75%)	4 (44.44%)	37 (64.91%)
Bank	1 (2.08%)	0	1 (1.75%)
Commodity Board	3 (6.25%)	0	3 (5.26%)
Family	3 (6.25%)	4 (44.44%)	7 (12.28%)
Friends	7 (14.58%)	1 (11.11%)	8 (14.04%)
Employer	1 (2.08%)	0	1 (1.75%)
TOTAL	48 (100.00%)	9 (100.00%)	57

Statistic	DF	Value	Prob
Pearsons chi-squared test	5	10.70	0.0578

TABLE 27 : DIFFERENCES IN NUMBER OF FARMERS BORROWING BY TYPE OF COLLATERAL OFFERED AND FARMSIZE (Q29)

FARMSIZE					
COLLATERAL	TINY	SMALL	MEDIUM	LARGE	TOTAL
Title	5 (27.78%)	0	3 (25.00%)	9 (75.00%)	17 (40.48%)
None	13 (72.22%)	0	9 (75.00%)	3 (25.00%)	25 (59.52%)
TOTAL	18 (100.00%)	0	12 (100.00%)	12 (100.00%)	42

Statistic	DF	Value	Prob
Pearsons chi-squared test	2	8.334	0.0155**

TABLE 28 : NUMBER OF FARMERS OBSERVING DIFFERENT TYPES OF SOIL EROSION BY THE FREQUENCY OF FORKING LAND FOR CASH CROPS (Q37B)

FREQUENCY OF FORKING (TIMES/YEAR)

EROSION	1X	2X	3X	4X	TOTAL
Fertility	13 (17.11%)	10 (22.22%)	4 (36.36%)	0	27 (19.42%)
Stones	9 (11.84%)	5 (11.11%)	0	1 (14.29%)	15 (10.79%)
Gullies	45 (59.21%)	24 (53.33%)	5 (45.45%)	5 (71.43%)	79 (56.83%)
Landslide	9 (11.84%)	6 (13.33%)	2 (18.18%)	1 (14.29%)	18 (12.95%)
TOTAL	76 (100.00%)	45 (100.00%)	11 (100.00%)	7 (100.00%)	139

Statistic	DF	Value	Prob
Pearsons chi-squared test	9	5.729	0.7667

TABLE 29 : DIFFERENCES IN THE NUMBER OF FARMERS OBSERVING SOIL EROSION AND THE TYPE OF CONTROL METHOD USED (Q37B & C)

TYPE OF SOIL EROSION					
CONTROL METHOD	SOIL	STONE	GULLY	LANDSLIDE	TOTAL
Contour	9 (26.47%)	8 (47.06%)	24 (24.24%)	3 (15.00%)	44 (25.88%)
Trench	10 (29.41%)	3 (17.65%)	39 (39.39%)	3 (15.00%)	55 (32.35%)
Terrace	2 (5.88%)	0	4 (4.04%)	0	6 (3.53%)
Trees	2 (5.88%)	0	3 (3.03%)	2 (10.00%)	7 (4.12%)
None	11 (32.35%)	6 (35.29%)	28 (28.28%)	10 (50.00%)	55 (32.35%)
Grass	0	0	1 (1.01%)	2 (10.00%)	3 (1.76%)
TOTAL	34 (100.00%)	17 (100.00%)	99 (100.00%)	20 (100.00%)	170

Statistic	DF	Value	Prob
Pearsons chi-squared test	15	24.79	0.0526

TABLE 30 : DIFFERENCES IN THE SOURCE OF FARMING INFORMATION BY AGE (Q39)

SOURCE	AGE (YEARS)					TOTAL
	20-29	30-39	40-49	50-59	60+	
Radio	11 (19.30%)	18 (19.78%)	22 (22.68%)	29 (21.80%)	54 (22.50%)	134 (21.68%)
TV	5 (8.77%)	10 (10.99%)	5 (5.15%)	9 (6.77%)	17 (7.08%)	46 (7.44%)
Extension	5 (8.77%)	8 (8.79%)	13 (13.40%)	12 (9.02%)	35 (14.58%)	73 (11.81%)
JAS	4 (7.02%)	6 (6.59%)	7 (7.22%)	11 (8.27%)	28 (11.67%)	56 (9.06%)
Friends	14 (24.56%)	17 (18.68%)	20 (20.62%)	24 (18.05%)	38 (15.83%)	113 (18.28%)
Newspaper	5 (8.77%)	7 (7.69%)	4 (4.12%)	3 (2.26%)	8 (3.33%)	27 (4.37%)
McDonald Almanac	10 (17.54%)	16 (17.58%)	17 (17.53%)	26 (19.55%)	37 (15.42%)	106 (17.15%)
Training	2 (3.51%)	5 (5.49%)	5 (5.15%)	11 (8.27%)	11 (4.58%)	34 (5.50%)
HASP	0	0	0	5 (3.76%)	0	5 (.81%)
Banana Growers	0	0	1 (1.03%)	0	1 (.42%)	2 (.32%)
Experience	1 (1.75%)	3 (3.30%)	3 (3.09%)	3 (2.26%)	11 (4.58%)	21 (3.40%)
None	0	1 (1.10%)	0	0	0	1 (.16%)
TOTAL	57 (100.00%)	91 (100.00%)	97 (100.00%)	133 (100.00%)	240 (100.00%)	618

Statistic	DF	Value	Prob
Pearsons chi-squared test	44	50.96	0.2189

TABLE 31 : DIFFERENCE IN THE SOURCE OF FARMING INFORMATION BY FARMSIZE (Q39)

FARMSIZE					
SOURCE	TINY	SMALL	MEDIUM	LARGE	TOTAL
Radio	19 (22.62%)	46 (25.14%)	28 (18.06%)	19 (18.45%)	112 (21.33%)
TV	10 (11.90%)	11 (6.01%)	8 (5.16%)	8 (7.77%)	37 (7.05%)
Extension	9 (10.71%)	21 (11.48%)	24 (15.48%)	14 (13.59%)	68 (12.95%)
JAS	6 (7.14%)	15 (8.20%)	17 (10.97%)	14 (13.59%)	52 (9.90%)
Friends	18 (21.43%)	38 (20.77%)	29 (18.71%)	10 (9.71%)	95 (18.10%)
Newspaper	3 (3.57%)	7 (3.83%)	4 (2.58%)	6 (5.83%)	20 (3.81%)
McDonald Almanac	13 (15.48%)	30 (16.39%)	29 (18.71%)	19 (18.45%)	91 (17.33%)
Training	1 (1.19%)	6 (3.28%)	11 (7.10%)	11 (10.68%)	29 (5.52%)
HASP	0	2 (1.09%)	1 (.65%)	1 (.97%)	4 (.76%)
Banana Growers	0	1 (.55%)	0	0	1 (.19%)
Experience	5 (5.95%)	6 (3.28%)	4 (2.58%)	1 (.97%)	16 (3.05%)
TOTAL	84 (100.00%)	183 (100.00%)	155 (100.00%)	103 (100.00%)	525

Statistic	DF	Value	Prob
Pearsons chi-squared test	30	35.11	0.2388

TABLE 32 : DIFFERENCES IN THE SOURCE OF FARMING INFORMATION BY GENDER (Q39)

SOURCE	SEX		TOTAL
	MALE	FEMALE	
Radio	101 (21.04%)	33 (24.09%)	134 (21.72%)
TV	34 (7.08%)	12 (8.76%)	46 (7.46%)
Extension	64 (13.33%)	9 (6.57%)	73 (11.83%)
JAS	45 (9.38%)	11 (8.03%)	56 (9.08%)
Friends	80 (16.67%)	33 (24.09%)	113 (18.31%)
Newspaper	17 (3.54%)	9 (6.57%)	26 (4.21%)
McDonald Almanac	88 (18.33%)	18 (13.14%)	106 (17.18%)
Training	30 (6.25%)	4 (2.92%)	34 (5.51%)
HASP	3 (.63%)	2 (1.46%)	5 (.81%)
Banana Growers	2 (.42%)	0	2 (.32%)
Experience	15 (3.13%)	6 (4.38%)	21 (3.40%)
None	1 (.21%)	0	1 (.16%)
TOTAL	480 (100.00%)	137 (100.00%)	617

Statistic	DF	Value	Prob
Pearsons chi-squared test	11	16.80	0.1140

TABLE 33 : DIFFERENCE IN MEMBERSHIP IN FARMERS ORGANIZATIONS BY AGE (044)

ORGANIZATION	AGE (YEARS)					TOTAL
	20-29	30-39	40-49	50-59	60+	
Cocoa Board	9 (50.00%)	13 (34.21%)	16 (38.10%)	31 (40.79%)	71 (43.03%)	140 (41.30%)
Coffee Board	5 (27.78%)	11 (28.95%)	5 (11.90%)	17 (22.37%)	32 (19.39%)	70 (20.65%)
Citrus Growers	0	0	2 (4.76%)	1 (1.32%)	4 (2.42%)	12 (3.54%)
Coconut	0	1 (2.63%)	1 (2.38%)	1 (1.32%)	9 (5.45%)	68 (20.06%)
JAS	1 (5.56%)	6 (15.79%)	13 (30.95%)	14 (18.42%)	34 (20.61%)	3 (.88%)
JLA	2 (11.11%)	1 (2.63%)	0	0	0	16 (4.13%)
P.C. Bank	0	3 (7.89%)	2 (4.76%)	5 (6.58%)	6 (3.64%)	7 (2.06%)
Banana	1 (5.56%)	0	2 (4.76%)	2 (2.63%)	9 (5.45%)	2
H.A.S.P	0	2 (5.26%)	1 (2.38%)	4 (5.26%)	0	(.59%)
Cane Growers	0	1 (2.63%)	0	1 (1.32%)	0	
TOTAL	18 (100.00%)	38 (100.00%)	42 (100.00%)	76 (100.00%)	165 (100.00%)	339

Statistic	DF	Value	Prob
Pearsons chi-squared test	36	60.63	0.0063**

TABLE 34 : DIFFERENCE IN MEMBERSHIP IN FARMERS ORGANIZATION BY GENDER (Q44)

SEX			
ORGANIZATION	MALE	FEMALE	TOTAL
Cocoa Board	101 (37.69%)	39 (53.42%)	140 (41.06%)
Coffee Board	57 (21.27%)	13 (17.81%)	70 (20.53%)
Citrus Growers	5 (1.87%)	2 (2.74%)	7 (2.05%)
Coconut Growers	13 (4.85%)	1 (1.37%)	14 (4.11%)
JAS	59 (22.01%)	9 (12.33%)	68 (19.94%)
JLA	2 (.75%)	1 (1.37%)	3 (.88%)
P.C. Bank	15 (5.60%)	1 (1.37%)	16 (4.69%)
Banana Growers	12 (4.48%)	2 (2.74%)	14 (4.11%)
H.A.S.P	3 (1.12%)	4 (5.48%)	7 (2.05%)
Cane Growers	1 (.37%)	1 (1.37%)	2 (.59%)
TOTAL	268 (100.00%)	73 (100.00%)	341

Statistic	DF	Value	Prob
Pearsons chi-squared test	9	17.55	0.0409*

TABLE 35 : DIFFERENCES FOR REASON FOR MEMBERSHIP BY FARMERS ORGANIZATION (044)

REASON FOR MEMBERSHIP						
ORGANIZATION	INPUTS	CREDIT	ADVICE	MARKET	INFORM	TOTAL
Commodity Board	79 (28.94%)	1 (.37%)	3 (1.10%)	181 (66.30%)	9 (3.30%)	273 (100.00%)
JAS	7 (10.29%)	2 (2.94%)	20 (29.41%)	6 (8.82%)	33 (48.53%)	68 (100.00%)
JLA	0	0	0	0	3 (100.00%)	3 (100.00%)
P.C. Bank	2 (14.29%)	12 (85.71%)	0	0	0	14 (100.00%)
AIBGA	7 (35.00%)	3 (15.00%)	1 (5.00%)	9 (45.00%)	0	20 (100.00%)
H.A.S.P	11 (68.75%)	1 (6.25%)	1 (6.25%)	0	3 (18.75%)	16 (100.00%)
TOTAL	106 (26.90%)	19 (4.82%)	25 (6.35%)	196 (49.75%)	48 (12.18%)	394

Statistic	DF	Value	Prob
Pearsons chi-squared test	20	465.7	0.0001**

APPENDIX VI: ANALYSIS TABLES FOR THE FARMERS' REGISTER SURVEY

TABLE 1: DIFFERENCES IN CROPPING PATTERN FOR NUMBER OF FARMERS GROWING THE CROP BY FARMSIZE

CROP	FARMSIZE				
	TINY	SMALL	MEDIUM	LARGE	TOTAL
Cocoa	194 (21.53%)	255 (15.60%)	159 (14.42%)	83 (11.53%)	691 (15.85%)
Coffee	34 (3.77%)	88 (5.38%)	73 (6.62%)	57 (7.92%)	252 (5.78%)
Citrus	15 (1.66%)	40 (2.45%)	33 (2.99%)	38 (5.28%)	126 (2.89%)
Coconut	43 (4.77%)	104 (6.36%)	81 (7.34%)	46 (6.39%)	274 (6.29%)
Mango	28 (3.11%)	73 (4.46%)	47 (4.26%)	38 (5.28%)	186 (4.27%)
Pimento	14 (1.55%)	37 (2.26%)	33 (2.99%)	31 (4.31%)	115 (2.64%)
Avocado	5 (.55%)	21 (1.28%)	26 (2.36%)	19 (2.64%)	71 (1.63%)
Lumber	8 (.89%)	44 (2.69%)	38 (3.45%)	27 (3.75%)	117 (2.68%)
Other	64 (7.10%)	111 (6.79%)	66 (5.98%)	40 (5.56%)	281 (6.45%)
Banana	199 (22.09%)	255 (15.60%)	148 (13.42%)	76 (10.56%)	678 (15.55%)
Plantain	27 (3.00%)	44 (2.69%)	32 (2.90%)	17 (2.36%)	120 (2.75%)
Sugar	17 (1.89%)	51 (3.12%)	37 (3.35%)	20 (2.78%)	125 (2.87%)
Yam	55 (6.10%)	89 (5.44%)	53 (4.81%)	28 (3.89%)	225 (5.16%)
Annual	50 (5.55%)	85 (5.20%)	48 (4.35%)	25 (3.47%)	208 (4.77%)
Fallow	34 (3.77%)	79 (4.83%)	47 (4.26%)	28 (3.89%)	188 (4.31%)
Pasture	7 (.78%)	32 (1.96%)	44 (3.99%)	47 (6.53%)	130 (2.98%)
Ruin	81 (8.99%)	173 (10.58%)	109 (9.88%)	77 (10.69%)	440 (10.09%)
Other	26 (2.89%)	54 (3.30%)	29 (2.63%)	23 (3.19%)	132 (3.03%)
TOTAL	901 (100.00%)	1635 (100.00%)	1103 (100.00%)	720 (100.00%)	4359

Statistic	DF	Value	Prob
Pearsons chi-squared test	51	232.2	0.0001**

TABLE 2: CROPPING PATTERN SIMILARITIES FOR NUMBER OF FARMERS GROWING THE CROP BY FARMSIZE

FARMSIZE					
CROPS	TINY	SMALL	MEDIUM	LARGE	TOTAL
Coconut	43 (12.87%)	104 (14.33%)	81 (16.84%)	46 (14.38%)	274 (14.72%)
Mango	28 (8.38%)	73 (10.06%)	47 (9.77%)	38 (11.88%)	186 (9.99%)
Pimento	14 (4.19%)	37 (5.10%)	33 (6.86%)	31 (9.69%)	115 (6.18%)
Other tree	64 (19.16%)	111 (15.29%)	66 (13.72%)	40 (12.50%)	281 (15.10%)
Plantain	27 (8.08%)	44 (6.06%)	32 (6.65%)	17 (5.31%)	120 (6.45%)
Sugar	17 (5.09%)	51 (7.02%)	37 (7.69%)	20 (6.25%)	125 (6.72%)
Fallow	34 (10.18%)	79 (10.88%)	47 (9.77%)	28 (8.75%)	188 (10.10%)
Ruin	81 (24.25%)	173 (23.83%)	109 (22.66%)	77 (24.06%)	440 (23.64%)
Other crop	26 (7.78%)	54 (7.44%)	29 (6.03%)	23 (7.19%)	132 (7.09%)
TOTAL	334 (100.00%)	726 (100.00%)	481 (100.00%)	320 (100.00%)	1861

Statistic	DF	Value	Prob
Pearsons chi-squared test	24	27.22	0.2941

TABLE 3: CROPPING PATTERN DIFFERENCES IN MAIN PARCEL FOR NUMBER OF FARMERS GROWING THE CROP BY TENURE

CROP	TENURE CLASS					
	FAMILY	LEASE	OWN	FREE	RENT	TOTAL
Cocoa	157 (18.60%)	29 (13.74%)	432 (18.31%)	7 (9.33%)	9 (6.38%)	634 (17.47%)
Coffee	50 (5.92%)	9 (4.27%)	147 (6.23%)	4 (5.33%)	4 (2.84%)	214 (5.09%)
Citrus	16 (1.90%)	3 (1.42%)	71 (3.01%)	2 (2.67%)	5 (3.55%)	97 (2.67%)
Coconut	43 (5.09%)	11 (5.21%)	172 (7.29%)	6 (8.00%)	9 (6.38%)	241 (6.64%)
Food tree	43 (5.09%)	13 (6.16%)	149 (6.32%)	8 (10.67%)	8 (5.67%)	221 (6.09%)
Lumber	25 (2.96%)	3 (1.42%)	59 (2.50%)	4 (5.33%)	0	91 (2.51%)
Other tree	171 (20.26%)	47 (22.27%)	473 (20.05%)	14 (18.67%)	34 (24.11%)	739 (20.36%)
Annual	165 (19.55%)	47 (22.27%)	449 (19.03%)	14 (18.67%)	32 (22.70%)	707 (19.48%)
Fallow	42 (4.98%)	17 (8.06%)	67 (2.84%)	5 (6.67%)	14 (9.93%)	145 (3.99%)
Pasture	28 (3.32%)	7 (3.32%)	59 (2.50%)	3 (4.00%)	3 (2.13%)	100 (2.75%)
Ruin	79 (9.36%)	22 (10.43%)	219 (9.28%)	6 (8.00%)	18 (12.77%)	344 (9.48%)
Other crop	25 (2.96%)	3 (1.42%)	62 (2.63%)	2 (2.67%)	5 (3.55%)	97 (2.67%)
TOTAL	844 (100.00%)	211 (100.00%)	2359 (100.00%)	75 (100.00%)	141 (100.00%)	3630

Statistic	DF	Value	Prob
Pearsons chi-squared test	44	83.70	0.0003**

TABLE 4: CROPPING PATTERN DIFFERENCES IN SECOND PARCEL FOR NUMBER OF FARMERS GROWING THE CROP BY TENURE

TENURE CLASS						
CROP	FAMILY	LEASE	OWN	FREE	RENT	TOTAL
Cocoa	18 (13.85%)	12 (16.00%)	109 (16.52%)	3 (12.50%)	6 (8.45%)	148 (15.42%)
Coffee	9 (6.92%)	4 (5.33%)	45 (6.82%)	0	1 (1.41%)	59 (6.15%)
Citrus	3 (2.31%)	1 (1.33%)	23 (3.48%)	0	1 (1.41%)	28 (2.92%)
Coconut	10 (7.69%)	1 (1.33%)	41 (6.21%)	1 (4.17%)	0	53 (5.52%)
Food tree	11 (8.46%)	5 (6.67%)	56 (8.48%)	1 (4.17%)	2 (2.82%)	75 (7.81%)
Lumber	3 (2.31%)	0	16 (2.42%)	0	0	19 (1.98%)
Other tree	26 (20.00%)	17 (22.67%)	130 (19.70%)	6 (25.00%)	21 (29.58%)	200 (20.83%)
Annual	25 (19.23%)	14 (18.67%)	116 (17.58%)	6 (25.00%)	20 (28.17%)	181 (18.85%)
Fallow	5 (3.85%)	6 (8.00%)	19 (2.88%)	4 (16.67%)	8 (11.27%)	42 (4.38%)
Pasture	2 (1.54%)	6 (8.00%)	15 (2.27%)	0	1 (1.41%)	24 (2.50%)
Ruin	18 (13.85%)	6 (8.00%)	66 (10.00%)	2 (8.33%)	9 (12.68%)	101 (10.52%)
Other crop	0	3 (4.00%)	24 (3.64%)	1 (4.17%)	2 (2.82%)	30 (3.13%)
TOTAL	130 (100.00%)	75 (100.00%)	660 (100.00%)	24 (100.00%)	71 (100.00%)	960

Statistic	DF	Value	Prob
Pearsons chi-squared test	44	73.45	0.0033**

TABLE 5: CROPPING PATTERN DIFFERENCES IN THIRD PARCEL FOR NUMBER OF FARMERS GROWING THE CROP BY TENURE

TENURE CLASS					
CROP	FAMILY	LEASE	OWN	RENT	TOTAL
Cocoa	11 (15.28%)	9 (16.67%)	46 (17.62%)	1 (5.88%)	67 (16.58%)
Coffee	5 (6.94%)	1 (1.85%)	18 (6.90%)	0	24 (5.94%)
Citrus	3 (4.17%)	3 (5.56%)	12 (4.60%)	0	18 (4.46%)
Coconut	4 (5.56%)	3 (5.56%)	14 (5.36%)	0	21 (5.20%)
Food tree	4 (5.56%)	4 (7.41%)	19 (7.28%)	1 (5.88%)	28 (6.93%)
Lumber	2 (2.78%)	3 (5.56%)	9 (3.45%)	0	14 (3.47%)
Other tree	16 (22.22%)	11 (20.37%)	48 (18.39%)	6 (35.29%)	81 (20.05%)
Annual	14 (19.44%)	9 (16.67%)	39 (14.94%)	6 (35.29%)	68 (16.83%)
Fallow	1 (1.39%)	3 (5.56%)	12 (4.60%)	0	16 (3.96%)
Pasture	1 (1.39%)	4 (7.41%)	3 (1.15%)	0	8 (1.98%)
Ruin	9 (12.50%)	4 (7.41%)	37 (14.18%)	3 (17.65%)	53 (13.12%)
Other crop	2 (2.78%)	0	4 (1.53%)	0	6 (1.49%)
TOTAL	72 (100.00%)	54 (100.00%)	261 (100.00%)	17 (100.00%)	404

Statistic	DF	Value	Prob
Pearsons chi-squared test	33	30.39	0.5976

TABLE 6: CROPPING PATTERN DIFFERENCES IN FOURTH PARCEL FOR NUMBER OF FARMERS GROWING THE CROP BY TENURE

TENURE CLASS					
CROP	FAMILY	LEASE	OWN	RENT	TOTAL
Cocoa	3 (11.54%)	6 (24.00%)	11 (16.42%)	1 (14.29%)	21 (16.80%)
Coffee	1 (3.85%)	0	4 (5.97%)	0	5 (4.00%)
Citrus	1 (3.85%)	2 (8.00%)	2 (2.99%)	0	5 (4.00%)
Coconut	3 (11.54%)	0	4 (5.97%)	1 (14.29%)	8 (6.40%)
Food tree	2 (7.69%)	1 (4.00%)	5 (7.46%)	0	8 (6.40%)
Lumber	1 (3.85%)	0	2 (2.99%)	0	3 (2.40%)
Other tree	5 (19.23%)	6 (24.00%)	11 (16.42%)	2 (28.57%)	24 (19.20%)
Annual	3 (11.54%)	5 (20.00%)	9 (13.43%)	2 (28.57%)	19 (15.20%)
Fallow	0	0	5 (7.46%)	1 (14.29%)	6 (4.80%)
Pasture	1 (3.85%)	1 (4.00%)	4 (5.97%)	0	6 (4.80%)
Ruin	4 (15.38%)	3 (12.00%)	7 (10.45%)	0	14 (11.20%)
Others	2 (7.69%)	1 (4.00%)	3 (4.48%)	0	6 (4.80%)
TOTAL	26 (100.00%)	25 (100.00%)	67 (100.00%)	7 (100.00%)	125

Statistic	DF	Value	Prob
Pearsons chi-squared test	33	19.83	0.9657

TABLE 7: CROPPING PATTERN DIFFERENCES IN FIFTH PARCEL FOR NUMBER OF FARMERS GROWING THE CROP BY TENURE

TENURE CLASS				
CROP	FAMILY	LEASE	OWN	TOTAL
Cocoa	2 (11.76%)	1 (12.50%)	1 (7.69%)	4 (10.53%)
Coffee	2 (11.76%)	1 (12.50%)	1 (7.69%)	4 (10.53%)
Citrus	1 (5.88%)	0	0	1 (2.63%)
Coconut	1 (5.88%)	0	1 (7.69%)	2 (5.26%)
Food tree	2 (11.76%)	1 (12.50%)	1 (7.69%)	4 (10.53%)
Lumber	1 (5.88%)	1 (12.50%)	0	2 (5.26%)
Other tree	2 (11.76%)	1 (12.50%)	4 (30.77%)	7 (18.42%)
Annual	2 (11.76%)	1 (12.50%)	1 (7.69%)	4 (10.53%)
Fallow	0	0	2 (15.38%)	2 (5.26%)
Pasture	0	1 (12.50%)	0	1 (2.63%)
Ruin	2 (11.76%)	1 (12.50%)	2 (15.38%)	5 (13.16%)
Other crop	2 (11.76%)	0	0	2 (5.26%)
TOTAL	17 (100.00%)	8 (100.00%)	13 (100.00%)	38

Statistic	DF	Value	Prob
Pearsons chi-squared test	22	15.70	0.8304

TABLE 8: DIFFERENCES IN TYPE OF TENURE CLASS BY PARCEL FOR NUMBER OF FARMERS

TENURE CLASS						
PARCEL	FAMILY	LEASE	OWN	FREE	RENT	TOTAL
Parcel 1	191 (75.49%)	52 (55.32%)	521 (65.62%)	17 (70.83%)	37 (54.41%)	818 (66.34%)
Parcel 2	35 (13.83%)	23 (24.47%)	173 (21.79%)	7 (29.17%)	23 (33.82%)	261 (21.17%)
Parcel 3	19 (7.51%)	13 (13.83%)	76 (9.57%)	0	6 (8.82%)	114 (9.25%)
Parcel 4	6 (2.37%)	5 (5.32%)	20 (2.52%)	0	2 (2.94%)	33 (2.68%)
Parcel 5	2 (.79%)	1 (1.06%)	4 (.50%)	0	0	7 (.57%)
TOTAL	253 (100.00%)	94 (100.00%)	794 (100.00%)	24 (100.00%)	68 (100.00%)	1233

Statistic	DF	Value	Prob
Pearsons chi-squared test	16	29.20	0.0226*

TABLE 9: DIFFERENCE IN TYPE OF TENURE CLASS BY PARCEL FOR MEAN ACREAGE/PARCEL

TENURE CLASS						
PARCEL	FAMILY	LEASE	OWN	FREE	RENT	TOTAL
Parcel 1	4.4 (23.53%)	3.9 (25.83%)	3.6 (28.35%)	7.9 (87.78%)	3.2 (50.79%)	23.0 (37.22%)
Parcel 2	3.0 (16.04%)	1.8 (11.92%)	2.1 (16.54%)	1.1 (12.22%)	1.3 (20.63%)	9.3 (15.05%)
Parcel 3	2.2 (11.76%)	2.6 (17.22%)	2.6 (20.47%)	0	1.6 (25.40%)	9.0 (14.56%)
Parcel 4	4.3 (22.99%)	2.0 (13.25%)	2.9 (22.83%)	0	2.0 (3.17%)	9.4 (15.21%)
Parcel 5	4.8 (25.67%)	4.8 (31.79%)	1.5 (11.81%)	0	0	11.1 (17.96%)
TOTAL	18.7 (100.00%)	15.1 (100.00%)	12.7 (100.00%)	9.0 (100.00%)	6.3 (100.00%)	61.8

Statistic	DF	Value	Prob
Pearsons chi-squared test	16	193.1	0.0001**

TABLE 10: CROPPING PATTERN DIFFERENCES IN TINY FARMS FOR NUMBER OF FARMERS GROWING THE CROP BY GENDER

SEX			
CROP	FEMALE	MALE	TOTAL
Cocoa	86 (23.24%)	108 (20.34%)	194 (21.53%)
Coffee	13 (3.51%)	21 (3.95%)	34 (3.77%)
Citrus	8 (2.16%)	7 (1.32%)	15 (1.66%)
Coconut	14 (3.78%)	29 (5.46%)	43 (4.77%)
Mango	12 (3.24%)	16 (3.01%)	28 (3.11%)
Pimento	7 (1.89%)	7 (1.32%)	14 (1.55%)
Avocado	2 (.54%)	3 (.56%)	5 (.55%)
Lumber	2 (.54%)	6 (1.13%)	8 (.89%)
Other tree	30 (8.11%)	34 (6.40%)	64 (7.10%)
Banana	80 (21.62%)	119 (22.41%)	199 (22.09%)
Plantain	8 (2.16%)	19 (3.58%)	27 (3.00%)
Sugar	4 (1.08%)	13 (2.45%)	17 (1.89%)
Yam	18 (4.86%)	37 (6.97%)	55 (6.10%)
Annual	20 (5.41%)	30 (5.65%)	50 (5.55%)
Fallow	10 (2.70%)	24 (4.52%)	34 (3.77%)
Pasture	3 (.81%)	4 (.75%)	7 (.78%)
Ruin	41 (11.08%)	40 (7.53%)	81 (8.99%)
Other crop	12 (3.24%)	14 (2.64%)	26 (2.89%)
TOTAL	370 (100.00%)	531 (100.00%)	901

Statistic	DF	Value	Prob
Pearsons chi-squared test	17	15.97	0.5263

TABLE 11: CROPPING PATTERN DIFFERENCES IN SMALL FARMS FOR NUMBER OF FARMERS GROWING THE CROP BY GENDER

SEX			
CROP	FEMALE	MALE	TOTAL
Cocoa	66 (17.89%)	189 (14.93%)	255 (15.60%)
Coffee	24 (6.50%)	64 (5.06%)	88 (5.38%)
Citrus	9 (2.44%)	31 (2.45%)	40 (2.45%)
Coconut	24 (6.50%)	80 (6.32%)	104 (6.36%)
Mango	17 (4.61%)	56 (4.42%)	73 (4.46%)
Pimento	12 (3.25%)	25 (1.97%)	37 (2.26%)
Avocado	4 (1.08%)	17 (1.34%)	21 (1.28%)
Lumber	11 (2.98%)	33 (2.61%)	44 (2.69%)
Other tree	26 (7.05%)	85 (6.71%)	111 (6.79%)
Banana	63 (17.07%)	192 (15.17%)	255 (15.60%)
Plantain	7 (1.90%)	37 (2.92%)	44 (2.69%)
Sugar	4 (1.08%)	47 (3.71%)	51 (3.12%)
Yam	14 (3.79%)	75 (5.92%)	89 (5.44%)
Annual	13 (3.52%)	72 (5.69%)	85 (5.20%)
Fallow	14 (3.79%)	65 (5.13%)	79 (4.83%)
Pasture	3 (.81%)	29 (2.29%)	32 (1.96%)
Ruin	44 (11.92%)	129 (10.19%)	173 (10.58%)
Other crop	14 (3.79%)	40 (3.16%)	54 (3.30%)
TOTAL	369 (100.00%)	1266 (100.00%)	1635

Statistic	DF	Value	Prob
Pearsons chi-squared test	17	23.63	0.1297

TABLE 12: CROPPING PATTERN DIFFERENCES IN MEDIUM FARMS FOR NUMBER OF FARMERS GROWING THE CROP BY GENDER

SEX			
CROP	FEMALE	MALE	TOTAL
Cocoa	29 (16.57%)	130 (14.01%)	159 (14.42%)
Coffee	11 (6.29%)	62 (6.68%)	73 (6.62%)
Citrus	1 (.57%)	32 (3.45%)	33 (2.99%)
Coconut	12 (6.86%)	69 (7.44%)	81 (7.34%)
Mango	9 (5.14%)	38 (4.09%)	47 (4.26%)
Pimento	5 (2.86%)	28 (3.02%)	33 (2.99%)
Avocado	4 (2.29%)	22 (2.37%)	26 (2.36%)
Lumber	6 (3.43%)	32 (3.45%)	38 (3.45%)
Other tree	11 (6.29%)	55 (5.93%)	66 (5.98%)
Banana	22 (12.57%)	126 (13.58%)	148 (13.42%)
Plantain	7 (4.00%)	25 (2.69%)	32 (2.90%)
Sugar	6 (3.43%)	31 (3.34%)	37 (3.35%)
Yam	9 (5.14%)	44 (4.74%)	53 (4.81%)
Annual	8 (4.57%)	40 (4.31%)	48 (4.35%)
Fallow	6 (3.43%)	41 (4.42%)	47 (4.26%)
Pasture	4 (2.29%)	40 (4.31%)	44 (3.99%)
Ruin	20 (11.43%)	89 (9.59%)	109 (9.88%)
Other crop	5 (2.86%)	24 (2.59%)	29 (2.63%)
TOTAL	175 (100.00%)	928 (100.00%)	1103

Statistic	DF	Value	Prob
Pearsons chi-squared test	17	8.722	0.9486

TABLE 13: CROPPING PATTERN DIFFERENCES IN LARGE FARMS FOR NUMBER OF FARMERS GROWING THE CROP BY GENDER

CROP	SEX		TOTAL
	FEMALE	MALE	
Cocoa	11 (11.58%)	72 (11.52%)	83 (11.53%)
Coffee	7 (7.37%)	50 (8.00%)	57 (7.92%)
Citrus	4 (4.21%)	34 (5.44%)	38 (5.28%)
Coconut	5 (5.26%)	41 (6.56%)	46 (6.39%)
Mango	5 (5.26%)	33 (5.28%)	38 (5.28%)
Pimento	6 (6.32%)	25 (4.00%)	31 (4.31%)
Avocado	2 (2.11%)	17 (2.72%)	19 (2.64%)
Lumber	5 (5.26%)	22 (3.52%)	27 (3.75%)
Other tree	7 (7.37%)	33 (5.28%)	40 (5.56%)
Banana	9 (9.47%)	67 (10.72%)	76 (10.56%)
Plantain	1 (1.05%)	16 (2.56%)	17 (2.36%)
Sugar	1 (1.05%)	19 (3.04%)	20 (2.78%)
Yam	4 (4.21%)	24 (3.84%)	28 (3.89%)
Annual	4 (4.21%)	21 (3.36%)	25 (3.47%)
Fallow	4 (4.21%)	24 (3.84%)	28 (3.89%)
Pasture	3 (3.16%)	44 (7.04%)	47 (6.53%)
Ruin	10 (10.53%)	67 (10.72%)	77 (10.69%)
Other crop	7 (7.37%)	16 (2.56%)	23 (3.19%)
TOTAL	95 (100.00%)	625 (100.00%)	720

Statistic	DF	Value	Prob
Pearsons chi-squared test	17	13.15	0.7262

TABLE 14: NUMBER OF LIVESTOCK BY AGE

AGE (YEARS)				
LIVESTOCK	<30	31-60	>60	TOTAL
Goats	271 (23.69%)	591 (14.46%)	252 (20.10%)	1114 (17.18%)
Pigs	44 (3.85%)	231 (5.65%)	102 (8.13%)	377 (5.81%)
Chickens	758 (66.26%)	2590 (63.36%)	664 (52.95%)	4012 (61.86%)
Cows	59 (5.16%)	676 (16.54%)	234 (18.66%)	969 (14.94%)
Donkeys	12 (1.05%)	0	2 (.16%)	14 (.22%)
TOTAL	1144 (100.00%)	4088 (100.00%)	1254 (100.00%)	6486

Statistic	DF	Value	Prob
Pearsons chi-squared test	8	230.3	0.0001**

TABLE 15: NUMBER OF FARMERS OWNING LIVESTOCK BY AGE

AGE (YEARS)				
LIVESTOCK	<30	31-60	>60	TOTAL
Goats	34 (50.00%)	104 (43.88%)	48 (35.56%)	186 (42.27%)
Pigs	8 (11.76%)	33 (13.92%)	30 (22.22%)	71 (16.14%)
Chickens	6 (8.82%)	27 (11.39%)	8 (5.93%)	41 (9.32%)
Cows	19 (27.94%)	73 (30.80%)	47 (34.81%)	139 (31.59%)
Donkeys	1 (1.47%)	0	2 (1.48%)	3 (.68%)
TOTAL	68 (100.00%)	237 (100.00%)	135 (100.00%)	440

Statistic	DF	Value	Prob
Pearsons chi-squared test	8	14.39	0.0760

TABLE 16: NUMBER OF LIVESTOCK BY FARMSIZE

FARMSIZE					
LIVESTOCK	TINY	SMALL	MEDIUM	LARGE	TOTAL
Goats	207 (14.89%)	249 (12.30%)	238 (11.43%)	420 (42.47%)	1114 (17.18%)
Pigs	85 (6.12%)	78 (3.85%)	68 (3.27%)	146 (14.76%)	377 (5.81%)
Chickens	1062 (76.40%)	1216 (60.05%)	1524 (73.20%)	210 (21.23%)	4012 (61.86%)
Cows	36 (2.59%)	469 (23.16%)	251 (12.06%)	213 (21.54%)	969 (14.94%)
Donkeys	0	13 (.64%)	1 (.05%)	0	14 (.22%)
TOTAL	1390 (100.00%)	2025 (100.00%)	2082 (100.00%)	989 (100.00%)	6486

Statistic	DF	Value	Prob
Pearsons chi-squared test	12	1268	0.0001**

TABLE 17: NUMBER OF FARMERS OWNING LIVESTOCK BY FARMSIZE

FARMSIZE					
LIVESTOCK	TINY	SMALL	MEDIUM	LARGE	TOTAL
Goats	51 (54.26%)	59 (39.33%)	46 (41.07%)	31 (36.47%)	187 (42.40%)
Pigs	15 (15.96%)	28 (18.67%)	18 (16.07%)	10 (11.76%)	71 (16.10%)
Chickens	13 (13.83%)	15 (10.00%)	9 (8.04%)	4 (4.71%)	41 (9.30%)
Cows	15 (15.96%)	46 (30.67%)	38 (33.93%)	40 (47.06%)	139 (31.52%)
Donkeys	0	2 (1.33%)	1 (.89%)	0	3 (.68%)
TOTAL	94 (100.00%)	150 (100.00%)	112 (100.00%)	85 (100.00%)	441

Statistic	DF	Value	Prob
Pearsons chi-squared test	12	26.29	0.0098**

TABLE 18: NUMBER OF LIVESTOCK BY FARMSIZE AND GENDER

TINY FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	72 (7.68%)	135 (29.87%)	207 (14.89%)
Pigs	28 (2.99%)	57 (12.61%)	85 (6.12%)
Chickens	835 (89.02%)	227 (50.22%)	1062 (76.40%)
Cows	3 (.32%)	33 (7.30%)	36 (2.59%)
TOTAL	938 (100.00%)	452 (100.00%)	1390

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	264.6	0.0001**

SMALL FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	39 (4.39%)	210 (18.49%)	249 (12.30%)
Pigs	22 (2.47%)	56 (4.93%)	78 (3.85%)
Chickens	814 (91.56%)	402 (35.39%)	1216 (60.05%)
Cows	2 (.22%)	467 (41.11%)	469 (23.16%)
Donkeys	12 (1.35%)	1 (.09%)	13 (.64%)
TOTAL	889 (100.00%)	1136 (100.00%)	2025

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	722.8	0.0001**

TABLE 19: NUMBER OF LIVESTOCK BY FARMSIZE AND GENDER

MEDIUM FARMS

LIVESTOCK	SEX		TOTAL
	FEMALE	MALE	
Goats	26 (8.23%)	212 (12.00%)	238 (11.43%)
Pigs	25 (7.91%)	43 (2.43%)	68 (3.27%)
Chickens	262 (82.91%)	1262 (71.46%)	1524 (73.20%)
Cows	3 (.95%)	248 (14.04%)	251 (12.06%)
Donkeys	0	1 (.06%)	1 (.05%)
TOTAL	316 (100.00%)	1766 (100.00%)	2082

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	71.06	0.0001**

LARGE FARMS

LIVESTOCK	SEX		TOTAL
	FEMALE	MALE	
Goats	13 (59.09%)	407 (42.09%)	420 (42.47%)
Pigs	0	146 (15.10%)	146 (14.76%)
Chickens	0	210 (21.72%)	210 (21.23%)
Cows	9 (40.91%)	204 (21.10%)	213 (21.54%)
TOTAL	22 (100.00%)	967 (100.00%)	989

Statistic	DF	Value	Prob
Pearsons chi-squared test	3	13.48	0.0037**

TABLE 20: NUMBER OF FARMERS OWNING LIVESTOCK BY FARMSIZE AND GENDER

TINY FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	20 (50.00%)	31 (57.41%)	51 (54.26%)
Pigs	9 (22.50%)	6 (11.11%)	15 (15.96%)
Chickens	8 (20.00%)	5 (9.26%)	13 (13.83%)
Cows	3 (7.50%)	12 (22.22%)	15 (15.96%)
TOTAL	40 (100.00%)	54 (100.00%)	94

Statistic	DF	Value	Prob
Pearsons chi-squared test	3	7.138	0.0676

SMALL FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	10 (34.48%)	49 (40.50%)	59 (39.33%)
Pigs	10 (34.48%)	18 (14.88%)	28 (18.67%)
Chickens	7 (24.14%)	8 (6.61%)	15 (10.00%)
Cows	1 (3.45%)	45 (37.19%)	46 (30.67%)
Donkeys	1 (3.45%)	1 (.83%)	2 (1.33%)
TOTAL	29 (100.00%)	121 (100.00%)	150

Statistic	DF	Value	Prob
Pearsons chi-squared test	4	22.11	0.0002**

TABLE 21: NUMBER OF FARMERS OWNING LIVESTOCK BY FARMSIZE AND GENDER

MEDIUM FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	10 (55.56%)	39 (40.21%)	49 (42.61%)
Pigs	4 (22.22%)	14 (14.43%)	18 (15.65%)
Chickens	3 (16.67%)	6 (6.19%)	9 (7.83%)
Cows	1 (5.56%)	37 (38.14%)	38 (33.04%)
Donkeys	0	1 (1.03%)	1 (.87%)
TOTAL	18 (100.00%)	97 (100.00%)	115

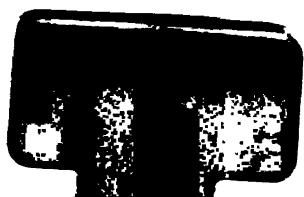
Statistic	DF	Value	Prob
Pearsons chi-squared test	4	8.625	0.0712

LARGE FARMS

SEX			
LIVESTOCK	FEMALE	MALE	TOTAL
Goats	3 (50.00%)	28 (35.44%)	31 (36.47%)
Pigs	0	10 (12.66%)	10 (11.76%)
Chickens	0	4 (5.06%)	4 (4.71%)
Cows	3 (50.00%)	37 (46.84%)	40 (47.06%)
TOTAL	6 (100.00%)	79 (100.00%)	85

Statistic	DF	Value	Prob
Pearsons chi-squared test	3	1.399	0.7057

NOTES



This publication is a product of the "Improving Watershed Management and Increasing Socio-economic Well-being through Farming System Research and Development", a sub-project of the Hillside Agriculture Project funded jointly by the Government of Jamaica, the United States Agency for International Development, and the Inter-American Institute for Cooperation on Agriculture.