HOUSEHOLD COMPOSITION: IMPLICATIONS FOR TAILORING RESEARCH AND EXTENSION PROGRAMS

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Abstract

The small farmer in the Dominican Republic experiences economic insecurity and deteriorating environmental conditions. Utilizing on-farm research, the Association of Coffee Producers of Los Cacaos and the Center for Planning and Ecumenical Action implemented a crop diversification project in the coffee-producing region of Los Cacaos. The purpose of this study was to examine household economic stability upon the introduction of passion fruit (Passiflora spp.), mapuey (Dioscorea cayenensis), and ñame (Dioscorea rotundata). The researchers used a mixed methodology approach to identify cash, food, credit, and labor associated with the livelihood system of six households with varied compositions, and to examine the influence of the traditional agricultural system versus the adoption of alternative crops (passion fruit, mapuey, and ñame) upon simulated models of the six households with varied compositions. The data revealed that households with increased labor displayed higher potential annual year-end cash for discretionary spending while those with minimal labor, specifically female-headed households, did not. Findings support the importance of examining household composition when developing and tailoring on-farm trials for low resource farmers.

Introduction

In the Dominican Republic, the Center for Planning and Ecumenical Action (CEPAE) is a Non-Governmental Organization (NGO) founded on October 27, 1970. The agro-ecology team from CEPAE utilizes participatory approaches to development, and believes that agriculture is part of a rural system of knowledge as well as a part of a social system of communal food (CEPAE, 1996). The focus of this research is to examine the results a CEPAE crop diversification project in Los Cacaos, a village in the Province of San Cristobal.

With coffee constituting the primary crop of Los Cacaos, the farming season is composed of the coffee production season from November through March and the non-coffee season from April through October. Coffee production is dependent upon family labor, as well as an influx of Haitian and Dominican laborers. Production in the non-coffee season is dependent upon labor from the household to produce maize, rice, plantains, bananas, cassava, yams, and beans in the tierra blanca (land not in coffee production used for all other production needs). A major constraint in the farming system involves the generation of year-end cash for discretionary spending during the off-season. Other constraints include deteriorating soil quality (Ledesma, 1996) and unstable coffee prices driven by the international market (Carrasco, 1991).

One important institution in the area is ASOCAES (Association of Coffee Producers of Los Cacaos). ASOCAES has processed, transported, and sold coffee of its members. They also provide a variety of services such as food credit (for the non-coffee season) and a reduced cost pharmacy. In 1991, an accord, signed between the CEPAE and ASOCAES, initiated a demonstration plot showcasing hillside sustainable agriculture. The objective was to generate a valid reference for the diversification of small and medium-scale coffee producers. The project had the following goals: (1) generate money during the non-coffee season, (2) improve food security, and (3) introduce low cost techniques to prevent soil erosion and enhance soil fertility.

In order to achieve these goals, plantains (*Musa paradisiaca*), bananas (*Musa acuninata*), passion fruit (*Passiflora* spp.), mapuey (*Dioscorea cayenensis*), and ñame (*Dioscorea rotundata*) were introduced to create food and cash in the short term. Macademia (*Macadamia tetryphylla*.), zapote (*Ponteria sapota)*, carambola (*Averhoa carambola)*, mandarins *(Citrus reticalata*), and avocados (*Persea americana*) were introduced to serve as the source of cash in the long term. Hardwood species of oak (*Cataalpa longisiligua*) and palm heart (*Columbrina ferrunginosa*) were presented for firewood and sold for lumber. Additionally, an alternative soil management program was introduced. A minimum till system using planting with the contour, composting, and maintenance of maximum ground cover was introduced to address problems of erosion and diminishing agricultural production.

An evaluation of the project showed that passion fruit (32.2%), mapuey (26.7%), and ñame (27.7%) were the most widely utilized crops providing the highest substantial economic benefits (Pomeroy, 2000). This brings up a series of questions regarding the presented crops. Do trends exist amongst the adopters? If so, can these trends be

characterized to decode the diversity of this agro-ecosystem (Sullivan, 1999)? Under what circumstances were the participants secure economically? This study will concentrate on the last question, determining the conditions resulting in economic security. Prior research has shown that farm size (Weil, 1970; Parsatharathy & Prasad, 1978; Reiche, 1995; Hernandez, 1995), availability of labor (Hicks & Johnson, 1974; Harriss, 1972; Aliviar, 1972; Spenser & Byerlee, 1976; Weil, 1970; Reiche, 1995; Urrea, 1995: Sullivan, 1999: Anderson, 1999), and supply constraints (Clay, 1975; Duff, 1978; Vyas, 1975) are factors that may affect the adaptability of new technologies. These constraints will be considered in this analysis.

Purpose and Objectives

The purpose of the paper was to evaluate the capacity of passion fruit, mapuey, and ñame to provide economic stability within the existing farming system. Economic stability is defined by Chambers (1993) as "adequate stocks and flow of food and cash to meet basic needs and to support well being" (p.10). In this study economic stability is reached when selected households experience either an increase in year-end cash for discretionary spending or a reduction in costs due to participation in CEPAE's program, resulting in the household's ability to cover annual expenditures. Therefore, economic security is measured through maximum year-end cash potential for each specific household. The following objectives guided the study: (1) identify cash, food, credit, and labor associated with the livelihood system of six households with varied compositions, and (2) examine the influence of the traditional agricultural system versus the adoption of alternative crops (passion fruit, mapuey, and ñame) upon simulated models of the six households with varied compositions.

Methods

The research used a combination of qualitative and quantitative methodologies. The quantitative portion was conducted through development of a 29-item questionnaire completed by 90 members of the ASOCAES. Face and content validity of the instrument were established by a panel of experts at the University of Florida and individuals involved in the project from the Dominican Republic. Post hoc Cronbach's alpha estimates of internal consistency ranged from r=.83 to r=.94 on the three Likert-based constructs assessing perceptions of the program's impact upon economic stability, soil erosion prevention, and capacity to adopt specific innovations.

The qualitative elements of the study included individual interviews conducted with three members of the agro-ecological team from CEPAE, 105 members from ASOCAES, two members from the state institution of INDRHI (National Institute of Hydraulic Resources), and two members from the Autonomous University of Santo Domingo (UASD) that implemented the program. These interviews concentrated upon the role of the organizations in the diversification process. The final source of information was through existing records.

Data were collected during the summer of 1999. Descriptive statistics and linear programming were used to summarize and analyze the data. Linear programming was used to model the livelihood systems (including production options, available land (crops), labor

availability, cash available, and cash and consumer needs). According to Hildebrand and Araujo (1997) a linear program requires the following information: (1) "The farm and non-farm activities and options with their respective resource requirements and any constraint on their production, (2) the fixed requirements and other maximum or minimum constraints that limit family or farm production, (3) cash costs and returns of each activity, and (4) a defined objective or objective functions" (p.7).

Results and Conclusions

The initial objective was to identify cash, food, and labor required by the six selected household. Table 1 lists each household composition. This background information was used to calculate household expenditures and available labor. The annual cash needs of each household were calculated by accounting for each household member's expected monetary requirements for transportation, clothing, school fees, and other necessities (Table 2). The linear program allows for selection of producing or purchasing crops, dependent upon the financial standing of the household. Households three, four and five had the highest annual cash requirements at: 27,520, 27,560 and 28,460 pesos respectively. This results from the high number of individuals in these households. Household six had relatively low annual cash requirements at 12,560 pesos, followed by household one at 22,720 pesos and household two at 23,920 pesos.

Table 1. Family Composition of Six Households

Household	One	Two	Three	Four	Five	Six
Adult ?	1	1	1	1	1	0
Adult ?	1	1	1	1	1	1
Adolescent ?	0	0	0	2	3	0
Adolescent ?	0	0	0	2	3	0
Young Children	0	1	4	2	0	1

Table 2. Annual Cash[1] Needs of Six Households[2]

Household	One	Two	Three	Four	Five	Six
Trimester 1	6,080	6,480	7,680	7,280	6,680	3,440
Trimester 2	8,320	8,720	9,920	10,760[3]	12,860[3]	4,560
Trimester 3	8,320	8,720	9,920	9,520	8,920	4,560
Year End	22,720	23,920	27,520	27,560	28,460	12,560

[1] Reported in Dominican pesos. [2] Includes transportation, clothing, purchased food, and other necessities. [3] Includes school costs.

As presented in Table 3, the annual availability of labor (in days) for the eight households was calculated by totaling available weekly work hours, and subtracting responsibilities characteristic of particular household members as determined by gender or

age (i.e.: cooking, cleaning, child rearing). These household characteristics also assisted in determining required household consumption needs. Households four and five demonstrate the highest annual available labor for agriculture with 776 and 1,517 hours respectively. This labor is directly correlated with the number of adults (two adults in each) and adolescents (four in household four and six in household five). Households one, two, and three had more limited amounts (399, 347, and 297 respectively) of labor available, due to a household composition of two adults and varying numbers of young children (zero in household one, one in household two, and four in household three). Each additional child reduces the female labor available. The amount of labor available for the female head of household in household six was 127.

Table 3. Annual Days Available for Agricultural Labor in Six Households

Household	One	Two	Three	Four	Five	Six
Trimester 1	161	133	124	393	604	42
Trimester 2	118	107	86	191	456	42
Trimester 3	118	107	86	191	456	42
Year End	399	347	297	776	1,517	127

The daily pounds consumed of eggs, coffee, pigeon peas, bananas, plantains, maize, peppers, rice, beans, and cassava were used to estimate the annual pounds of consumption per household. Consumption requirements were adjusted according to varying household members, therefore accounting for varying consumption needs of men, women, adolescents, and children. Households four and five have the highest consumption rates, requiring 3,295 and 3,457 pounds of food per trimester. Households one, two, three, and six had the lowest calculated consumption figures, ranging between 748 and 1,215 pounds per trimester.

The second objective was to examine a model of the six households in terms of land combination, production activities (crop selection), and resources utilized (family and hired labor), and how they respond in the traditional agricultural system over time versus adopting the alternative crops of passion fruit, mapuey, and ñame. In the traditional agricultural system, all households produced crops for both consumption and sales. Specifically, coffee, bananas, and cassava served as the strongest year-end cash generators for discretionary spending. All households produced and sold coffee in relationship to the amount of family labor that they have available. Bananas were intercropped with coffee, therefore the amount of bananas produced was directly dependent upon the amount of land in coffee production. With the exception of household number four, all households produced enough cassava for family consumption and cash sales. Household four devoted land to plantains rather than cassava, a result of labor constraints of that household. Similarly, household one also experienced labor constraints and produced a very small amount of cassava. Finally, with the exception of household five, all households produced and sold a minimal amount of plantains as a cash generating activity. Due to the high available labor in household five, this household was able to grow the more labor-intensive and profitable crops.

In terms of the influence of the alternative crop adoption scenario, no households selected mapuey, due to the highly labor intensive activities involved with production.

Household five, experiencing an abundance of labor, selected large amounts of passion fruit. Households one and two, with slightly less available labor, selected a comparatively moderate amount of passion fruit, and significantly more ñame. Households three and six, with significantly less available household labor selected only ñame. These general preferences can be a reflection of the available labor and cash of each household. In order to accommodate these introduced crops, all households either eliminated or severely reduced previous cash generating crop activities. Cassava production was eliminated or reduced in all households. Upon eliminating this cash generating activity, households were able to devote land and labor to either passion fruit or ñame. Cassava required for household consumption was purchased. With the exception of household five, all households drastically reduced plantain production and eliminated selling any plantains. Household five produced the same amount of plantains, however it did not produce plantains as a cash generating activity. Maize production was significantly reduced, and maize required for animal feed and household consumption was purchased.

Educational Value

The crop diversification project introduced crops to the Los Cacaos area that can be economically beneficial. Production of either passion fruit or ñame resulted in increased year-end cash potential. However, the risk involved for these farmers may make the adoption of the crops slow. Upon utilizing the introduced crops, farmers may not simply eliminate traditional crops to replace them with passion fruit and ñame. Rather, farmers may add small amounts of these introduced crops to avoid greater risk involved with lack of diversification. The alternative crops would be economically beneficial to households one through six. The amount of benefit was tied to the labor available as well as cash and food needs as determined by household composition.

As a result of this study, the following recommendations are forwarded. First, development professionals should not isolate any single constraint (e.g., land, labor) and overemphasize an intervention based upon the constraint. This research demonstrates the intricacy of all inputs on the system. By examining multiple factors, and the interaction of such factors, a more explicit diagnosis of the working system will possible. Secondly, development professionals should pay close attention to household composition when designing programs. These data reveal that household needs are very diverse and are based on a large degree upon family composition. Finally, development professionals must use extreme caution when they advocate expansion of agricultural production or the introduction of a single crop or enterprise. The survival of the livelihood system often is dependent upon an existing diverse farming system.

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