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PARTICIPATORY SURVEY AND TREE CROP PREFERENCES ON ST. CROIX, U.S. VIRGIN ISLANDS.

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ABSTRACT: The number and size of farms in the US Virgin Islands (VI) have steadily declined since 1965 and only 6% of the land remains covered with natural forest or woodland (NASS 2001). Characterizing current production systems by direct observation and soliciting information directly from producers on St. Croix served to involve farmers in project formulation and began an active learning process as the basis for future activities. A participatory survey of farms and home gardens with producers to characterize species composition and geographic description of agriculture on St. Croix was made during the period April through June 2003. Two objectives of the project were to foster conservation of trees on farmland and promote enterprise development with nontimber products in collaboration with local institutions and producers. A geo-referenced (GPS) map point for each farm was also taken to compile with geographic information for the island of St. Croix. Additionally each interview included a walking transect with the producer to observe production practices and provide for informal discussion about land use. Based on survey results and data on soils, vegetation, land use, hydrology and further GIS analyses, a decision support system is under construction. The decision support system will be a useful tool for producers and professionals to determine viable planting sites for desired tree crop species. Project activities also include germplasm collection for native fruit tree domestication and planting to enhance biodiversity within the landscape.

Key words: producer interviews, GIS decision support, fruit trees, agroforestry, biodiversity

INTRODUCTION

A Forest Products survey conducted by collaborative efforts of the RC&D with the VI Department of Agriculture (VIDoA) and USDA Forest Service indicates there is good potential for more agroforestry and application of knowledge about native species and medicinal plants in production systems (VIDoA, 2001). Some of the best candidate species for accelerated domestication are found in home gardens or as the most valued species remaining in farm landscapes.

The Enda-Caribe project in the Dominican Republic developed agroforestry and reforestation projects with farmers that were profitable while increasing tree cover on marginal soils (Hernandez, 1995). These efforts increased availability of fuelwood and timber products for housing and commercial purposes. Jickling and While (1995) concluded from an economic analysis of agroforestry projects in Haiti that tree gardens around homes were a critical component of economic and cultural life. The authors pointed out the potential for greater productivity in home tree gardens with sustained economic and ecologic viability. In an approach to give credence to economic as well as ecologic considerations of agroforestry in Haiti, and an initial premise that trees are crops that could be planted, harvested and sold or used

as any other crop, analysis of a 20 year project showed how a good cash-earning opportunity evolved on terms farmers decided by themselves while providing soil conservation benefits (Murray and Bannister 2004).

The application of GIS and the development of spatial databases are becoming more widespread in rural and community development. Swindell et al., (2000) provide strong arguments for the utilization of full GIS for rural land management. The integration of GIS in farm or household level research efforts to promote sustainable rural development is also becoming more popular. While the development of conventional databases and decision-support systems has been more common in the field of agroforestry, the use of GIS is still relatively new and scarce in the discipline. Ellis et al., (2004) present comprehensive descriptions of computer-based tools used for agroforestry research and development.

The main focus of the tree crop project is multistrata agroforestry with indigenous fruits and crops for home consumption and local markets. Depending on farmer perception and demand, silvopastoral designs will also match goals of the project. The fruits and other non-timber forest products can be used for cottage or value added industry if the labor and market accept development (*e.g.* juice). The survey of existing farms/home gardens to characterize current production, indicate potential participation, and identify potential market products is the component of the on-going research described in this presentation.

METHODS

Semi-structured interviews (Dillman, 2000) and resource transects with producers (Abbott 1999) took place between April and July of 2003. UF/IFAS and UVI personnel conducted interviews and farm tours with each of 204 agricultural producers on St. Croix. Producer contacts came from a list of licensed farmers supplied by the VI Department of Agriculture. We found that the VIDoA listed just over 400 producers while the US Agricultural Census indicated the number of farmers on St. Croix as 205. From months of repeated effort we found 10% of the producers on the VIDoA list were no longer active in agriculture and that there were a few cases of duplicate names (<1%, usually within family) for the same parcel of land. Our survey thus represents 58% of the active producers listed by the VIDoA and is equivalent to over 99% of the national census count.

The interview/farm tour surveys provided data on species composition, production categories, management practices, land area and site characteristics along with demographic and ownership or lease characteristics. A geo-spatially referenced map point was taken during each interview to confirm the location for correlation with site factors. Among other questions, farmers were asked to indicate their most important agricultural product, preferred tree crops, preferences for future production, and level of interest in small business development.

RESULTS

Results show mean farmer age (Figure 1) was 56 years (min 27, max 91, median 53), 25% were female and 38% of the farmers interviewed were born on St. Croix. Proportionally a larger number of younger people identify themselves as agricultural producers in comparison to the US mainland and this percentage indicates the potential for intergenerational learning and continued food production on the island. For production, 74% of the producers farm up to 4 ha (10 acres) while 6% farm greater than 41 ha (100 acres) with a median value 2 ha (5 acres); 66%

own the land while 34% lease or have land use permits. The median number of agricultural products per farm was 15 and mean number 12.5. Of the farmers interviewed, 27% stated horticultural crops, 22% tree crops, and 31% animal production were the most important to them. Asked what other products they would like to cultivate, 46% stated they would like to add horticulture crops, 54% would add trees, and 11% would add animals if possible.

Seventy-five percent of farmers have some tree product and 69% of those are fruits. Semi-structured interviews and resource transects across each site with producers showed 64 total tree species cultivated on farms. Mango (48%), avocado (38%), coconut, mamee apple (24% each), and lime (21%) were the most abundant fruit species currently cultivated by producers (Figure 2). [For scientific names, see list in appendix]

When asked what tree species they would plant, 95% wanted something to eat or sell. The species most preferred for future planting, besides mango and avocado, were coconut (9%), mamee apple (9%), papaya (8%), orange, banana, mespel (6% each) and lime (5%) (Table 1).

Top ranked production practices were fertilization (90% organic, 48% inorganic), irrigation (59%), shade (58%), mulch (54%), pesticides (46%), and pasture rotation (45%). Thirty-five percent of the producers practice crop rotation, 26% utilizes organic pest control, and 12% use herbicides. Fish emulsion, seaweed and compost are used by 14% to15% of the producers. Some farmers (4%) maintained fishponds, rain catchments (39%) and actively managed terraces (9%) in their production systems (Figure 3). The majority learned these practices from their parents (63%) while others were self taught (17%) and fewer learned from school (7%), work (4%), or extension workshops (1%).

The majority of farmers (62%) on St. Croix are not from St. Croix. Of the farmers interviewed, the largest percentages of non-Crucians (not born on St. Croix and neither parent St. Croix born) were from Antigua (15%) and from St. Lucia (11%). Though some differences exist in land access (acquisition), it is most interesting to note that a significantly greater number of Crucians indicated animal production as most important while a significantly greater number of non-Crucians stated horticultural crops were their most important production. Crucians also farmed larger median land area than non-Crucians.

The most important current production varied seasonally for 23% of the agriculturalists. Tomato and cucumbers were ranked most important horticulture crops for 10% (each) of the farmers while the next most important were herbs and cassava (7% each). Top animal production by producers was 21% goats, 18% hair sheep, and 13% poultry. Farmers indicated they cultivated products for use by the family (16%), to sell (21%), or both for family consumption and to sell (54%).

Major concerns for the farmers included water (44%), price of inputs (26%), fencing (20%), theft (20%), and stray dogs (18%). In addition to formal questions, during discussion with producers, more workshops and extension information was voluntarily requested by 7% of the farmers. Though 31% state they have some business underway, 86% of the producers expressed interest in developing or amplifying an agriculturally-based business.

DISCUSSION

It was evident that agricultural producers on St. Croix valued trees and the majority were interested in growing more fruit or shade trees. Seeing how the ranking of tree types desired by farmers differs from the list of those currently produced indicates the potential for increasing both the abundance and diversity of fruit tree species cultivated on the island. There is clear

interest in small business development and great potential for participation in future tree crop activities.

Conservation of native species and domestication of native fruit crops will require collection and testing of local germplasm. The survey of agricultural production of various farms and gardens provides information on possible seed collection sites as well as an indication of what site qualities characterize favorable conditions for specific species production.

The spatial and relational databases created for this project can serve as a foundation for additional analyses and future studies. Graphical representations of the geographic distribution of specific tree species, species by soil type for example can be viewed to assist decision makers and researchers. Too, the relational database allows complex queries to be formulated for problem solving and decision support. Both professionals and producers could use the decision support system being developed for design of agroforestry practices. Agroforestry designs that combine annual and perennial crops can be employed to enhance food production, conserve soil, sustain agricultural livelihoods, and rehabilitate lands of the USVI.

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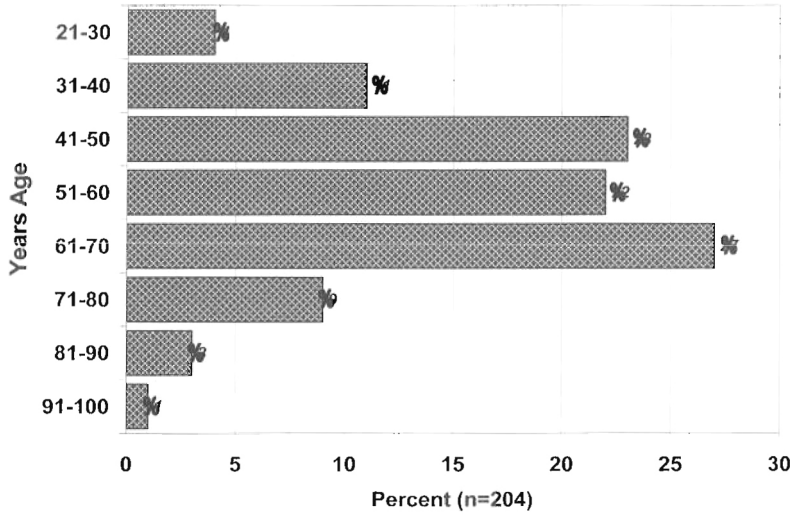

Figure 1. Range of age classes (years) and percentage of 204 farmers interviewed on St. Croix in each age class.

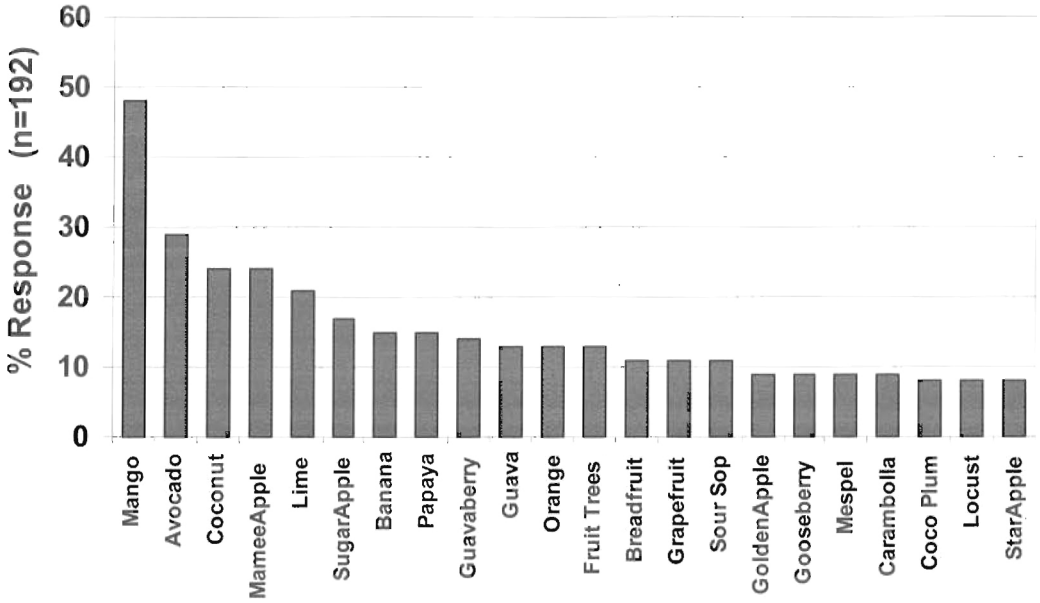

Figure 2. Percent current production of tree crops by interviewed producers on St. Croix.

Table 1. Fruit tree species desired for future planting by interviewed producers on St. Croix, n=118.

Preferred by	Scientific Name	Common Name
18%	*Mangifera indica,*	Mango
13%	*Persea americana,*	Avocado
10%	Fruit Trees	
9%	*Cocos nucifera,*	Coconut
9%	*Mammea americana,*	Mamee apple
8%	*Carica papaya,*	Papaya
6%	*Citrus sinensis,*	Orange
6%	*Musa* spp.,	Banana
6%	*Manilkara zapota,*	Mespel or sapodilla
5%	*Citrus aurantifolia* (or *C. latifolia),*	Lime (Tahiti lime)
5%	*Chryosophyllum cainito,*	Star apple/cainit
5%	*Artocarpus altilis,*	Breadfruit
5%	*Myrciaria floribunda,*	Guavaberry
5%	*Chrysobalanus icaco,*	Coco Plum
5%	*Passiflora* spp.,	Passion fruit
4%	*Averrhoa carambola,*	Star fruit or carambolla
4%	*Annona muricata,*	Soursop
3%	*Blighia sapida,*	Ackee
3%	*Pimenta racemosa,*	Bay Rum
3%	*Anacardium occidentale,*	Cashew
3%	*Pouteria campechiana,*	Eggfruit or canistel

Appendix: Common and scientific names, or specific epitaphs, for some of the tree crops observed during 2003 participatory survey on St. Croix, US Virgin Islands.

Common name	Scientific name	Common name	Scientific name
Barbados Cherry	*Malpighia punicifolia*	Jamaica Cherry	*Muntingia calabura*
Bay Rum	*Pimenta racemosa*	Jamaican Plum	*Spondias purpurea*
Birchberry	*Eugenia lugustrina*	Lignum-vitae	*Guaiacum officinale*
Black Calabash	*Enallagma latifolia*	Mamey sapote	*Pouteria platypus*
Black Olive	*Bucida buceras*	Mammee-apple	*Mammea americana*
Calabash	*Crescentia cujete*	Mesple	*Manilkara zapota*
Coco Plum	*Chrysobalanus icaco*	Silver Palm	*Coccothrinax argentea*
Golden Apple	*Spondias cytheria*	Soursop	*Annona muricata*
Gooseberry	*Phyllanthus acidus*	Spicy Guava	*Myrcianthes fragrans*
Grapefruit	*Citrus paradisi*	Star Apple	*Chrysophyllum cainito*
Guava	*Psidum guava*	Sugar Apple	*Annona squamosa*
Guavaberry	*Myrciaria floribunda*	West Indian Locust	*Hymenaea courbaril*
Ironwood	*Krugiodendron ferreum*	Jamacian Caper	*Capparis cynophallophora*