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South Florida Tropical Fruit Grower Perspectives: Water Conservation Management Practices[1]

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Introduction

The 2002 Census of Agriculture showed that Miami-Dade County had about 90,000 acres of agricultural land, distributed among 2,244 growers. Of the total farms, 63% were less than 10 acres and 89% were less than 50 acres in size. In 2002, the market value of agricultural products sold in Miami-Dade County was about $578 million, with an overall economic impact in excess of $2 billion.

Subtropical and tropical fruit production in Miami-Dade County is estimated to cover 13,000 acres, with the 2002 crop valued at $35.8 million. The main crops are avocado (~50% of the acreage), mango, carambola, lychee, longan, mamey sapote, banana/plantain, papaya, and guava. Minor crops include sapodilla, jackfruit, sugar apple, atemoya, star apple, pitaya, passion fruit, canistel, and white sapote. Demographically the commercial horticulture industry in Miami-Dade County is very diverse with roughly 60% of all producers having limited horticulture background (novice growers) and 60% of all producers being part-time commercial growers (TREC Strategic Plan, 2005). Due to increasing urbanization and growing concerns about water quality and quantity in south Florida, information on the views and practices of growers are essential for developing and promoting cost-effective conservation practices that will benefit both producers and consumers.

This survey was the first in a series of two designed to assess changing views of local agricultural producers in Miami-Dade County over the next three years regarding water quantity and quality management practices. Information from this first survey will be used to tailor future research and extension programs. Although the surveys targeted fruit and ornamental crops growers, only the fruit grower responses are reported in this publication.

Methods

The Water Conservation Survey (WCS) was developed by extension agents at the Miami-Dade/IFAS Cooperative Extension Service and extension specialists at the University of Florida, Tropical Research and Education Center (TREC) in

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Homestead, FL. Once completed, the survey instrument was submitted to the University of Florida Institutional Review Board for approval. Participation was voluntary and anonymity was assured.

Survey questions were either multiple choice or "yes/no". Questions arranged in 3 categories: background (8 questions), water quality and quantity opinions related to the home (7 questions), and water quality and quantity related to agriculture (12 questions). The background category was designed to collect general information from the respondents such as their orchard acreage, experience, and age. The water quality and quantity opinions related to the home category were included to gain insight into the everyday lifestyle of the respondents and their activities related to water conservation. The water quality and quantity questions related to agriculture category were designed to assess the current perceptions and practices of the respondents, focusing on best management practices (BMPs) for water conservation.

The survey was mailed to fruit growers identified on a mailing list provided by the Miami-Dade County Cooperative Extension Service. In addition, an on-line survey was posted on Florida Agricultural BMP BLOG (FABB) (http://fabb.ifas.ufl.edu). The survey was further advertised to local growers through their local organizational meetings. The survey was distributed in February 2006 and their responses received by the end of March 2006 were tabulated. Approximately 240 surveys were mailed to fruit growers. Of this a total 58 were returned resulting in a response rate of 24%. This was within the response range (10-50%) of other surveys (Nachmias and Nachmias, 1976; Neuman, 1997; Donan et al., 2000).

Current Demographics

Twenty two percent of the respondents indicated that that they relied on farming as their primary source of income, while a larger percentage (33%) considered themselves full time growers. This result is not surprising as many of the growers are part-time while others do not rely on farming as their only source of income.

Most of the orchards (57%) were between 1 to 9 acres. Ninety-four percent of fruit growers reported the size of their production unit as less than 49 acres. The majority (84%) of tropical fruit growers were over the age of 51 with 28% over 70 years of age.

Water Quality and Quantity Opinions: Everyday Lifestyle

Fruit growers indicated that they actively conserved water in their homes. For example, at least 72% of respondents reported not running the water faucet continually while brushing their teeth, not leaving lawn water hoses on longer than necessary, not running the dishwasher unless full, and not taking exceedingly long showers. Eighty-one percent of fruit growers were also interested in learning additional lifestyle changes that would conserve water. However, 23% felt that the actions that they practice to conserve water would not make a long-term difference.

The initiative shown by fruit growers to participate in water conservation practices in their home suggests some personal acknowledgement of the value (economic or environmental) of our water supply. The presence of this attitude is very encouraging and likely provides some existing behavioral groundwork for introducing and implementing water conservation practices in their agricultural enterprises.

Water Quantity and Quality Practices: Agriculture

In Florida, water conservation in agriculture is a major concern as evidenced by the development of commodity and regionally based Best Management Practice (BMP) manuals. The implementation of BMPs is being encouraged by the Florida Department of Environmental Protection (FDEP) through their incentive of Presumption of Compliance (For more information on the BMP process, see Migliaccio et al., 2006). Hence, survey questions regarding these issues were included. Of the fruit growers surveyed, 78% indicated that they would implement BMPs under the FDEP presumption of compliance incentive. However, 66% reported they would not spend more than $500 to implement the

BMPs. This suggests that cost sharing would be essential for some growers to implement BMPs. On the other hand, if BMPs were shown to be economically beneficial, 90% indicated their willingness to implement such practices. These results suggest the importance of economic analysis of BMPs and the transfer of this information to growers for their assessment and incorporation into everyday practices. Further discussion is provided on water-quantity and water-quality-based BMPs.

Water Quantity BMPs

Water quantity BMPs refer to management practices that conserve the amount of water used. The goal of implementing water quantity BMPs is to use water more efficiently so that less volume is required.

Several practices were suggested in the survey as potential water saving measures. Each of these was identified as being used or not used on the growers' farms in the past 5 years (Table 1).

In addition, each grower ranked the applicability of each of the practices (from Table 1). Fruit growers identified the least applicable practice as growing mainly drought tolerant plant species, with 22% reporting this practice as somewhat applicable or very applicable. Similar results were presented by Muñoz-Carpena et al. (2003) who found 21% of fruit growers were growing drought-tolerant fruit crops and that only an additional 7% indicated future plans to consider drought-tolerant plant species.

The most applicable water conservation practice identified by the survey was irrigating mainly in the early morning or late evening. Fifty-five percent of fruit growers indicated that this practice was very applicable with another 19% marking it as somewhat applicable. This was similar to previous survey results (Muñoz-Carpena et al., 2003) which indicated that 83% of fruit growers irrigated in the morning or late evening.

Table 1. Water quantity practices and survey response by fruit growers

Management Practice	% of Growers Using the Practice
Growing mainly drought tolerant plant species	16
Irrigating mainly in the early morning or late evening	72
Monitoring plant growth stages (phenology) and irrigating accordingly	40
Monitoring container or field soil moisture	26
Monitoring the weather and only irrigating during periods of dry weather	69
None	0
Other	14

Monitoring of plant growth stages for irrigation received a variety of responses from 33% indicating it was very applicable to 17% indicating it was not applicable.

Other methods of monitoring plant needs for irrigation include soil moisture monitoring and weather monitoring. Monitoring field soil moisture for irrigation management was considered a very applicable water conservation practice by 31% of fruit growers; however, a greater percentage (47%) indicated that monitoring weather was a very applicable water conservation practice. This coincides with additional survey results which showed that 69% of fruit growers had monitored local weather to regulate irrigation within the past 5 years. Fewer growers reported using soil moisture monitoring to determine irrigation needs (26%) over the same time period (see Table 1).

Water Quality BMPs

Water quality BMPs refer to practices that improve the quality of water by minimizing the potential for contaminating local water resources. The goal of water quality BMPs is to protect water supplies so that they are sufficient for meeting designated uses. Water quality BMPs were assessed by the growers responding to the survey with regards

to their use of the practice in the past 5 years (Table 2).

Growers provided additional information on the practices listed in Table 2 by indicating their applicability. The most applicable practice (with 53% responding as very applicable) was monitoring of local weather conditions to minimize use of agrochemicals immediately preceding a rainfall event. The three remaining practices (application of nutrients based on soil sampling, application of nutrients based on plant tissue analysis, and application of agrochemicals using a calibrated chemical injector) results were inconclusive with 22 to 26% responding as very applicable and 24 to 26% responding as not applicable.

Table 2. Water quality practices and survey response by fruit growers

Management Practice	% of Growers Using the Practice
Application of nutrients based on soil sampling	19
Application of nutrients based on plant tissue analysis	29
Monitoring local weather to avoid application of agrochemicals immediately preceding a rainfall event	72
Application of agrochemicals using a calibrated chemical injector with drip or micro irrigation	26
None	9
Other	10

Extension - Information Transfer

When asked, the growers identified cost (57%) as the primary reason for not implementing a practice. However, 22% indicated that knowledge regarding a technology could deter their implementation of a practice. Thus, there is an opportunity to educate a portion of growers as new BMP information and techniques become available through fact sheets, one-on-one meetings, field day demonstrations, and Internet BLOGS.

Fruit growers who responded to the survey indicated their preferred method of information transfer was mainly Extension fact sheets (53%), followed by short courses (31%). This is understandable since the majority of fruit growers (76%) do not earn their income primarily from farming; therefore, fact sheets and short courses are likely to be more accommodating to their schedules.

Summary

This survey was conducted to determine the current perspectives of local fruit growers in regards to water conservation practices. Results indicated that growers are predominantly working on small acreage (94% on less than 49 acres), predominantly over the age of 51 (81%), with only a small portion (33%) considering themselves full time growers. The majority of survey respondents practice water saving measures at home and indicated interest in learning of additional measures. Most fruit growers (78%) indicated an interest in implementing BMPs under the FEDP presumption of compliance incentive. The predominant practice already in use by fruit growers for both water quantity and quality was monitoring of weather to determine irrigation scheduling and for determining when best to apply agrochemicals. Currently, the method being used is to monitor weather and manually adjust the irrigation as needed. An alternative to this approach would be to use an automated system (such as a system operating based on historic evapotranspiration or a system that monitors weather parameters directly and automatically regulates irrigation rates and/or frequencies accordingly). Transfer of water conservation information is most beneficial to growers if presented in an Extension fact sheet (i.e., EDIS publication) or a short course (1 to 2 hours).

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