Levels of Technology Adoption Among Horticulture Firms in the Northern Gulf of Mexico

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Nature of Work. This socioeconomic (SEC) project is a part of a research program currently being undertaken by the Mississippi Agricultural and Forestry Experiment Station and the U.S. Department of Labor entitled "Enhancing Labor Performance of the Green Industry in the Gulf South." The overall goal of this SEC project is to develop a socioeconomic profile of horticulture workers and evaluate the impact of automation technologies on their employment, earnings, safety, skill-levels, recruitment and retention rates (1). This paper presents the level of technology adoption among nurseries located in the Northern Gulf of Mexico region which participated in the survey conducted from December 2003 to March 2005. A total of 87 Nursery Automation Survey Forms (NASF) were completed from personal interviews with horticulture firms randomly selected in Mississippi, Louisiana and Alabama. Participating nurseries were randomly selected from lists of wholesale nursery growers from each of the three states included in the Dec 2003 to Jan 2005 survey.

Results and Discussion. The 87 nurseries included in the survey reported a total of 1,804 acres or an average of 21 acres per nursery. Total open field production area was 926 acres while total greenhouse production area was 2.86 million sq. ft. Most participating nurseries were either single proprietorships (52%), corporations (30%), or partnerships (8%). Majority of the nurseries included in the survey reported annual gross sales of less than $250,000 (57%), 19% sold between $250,000 and $499,999, 12% grossed between $500,000 and $999,999, and the remaining 12% reported more than $1 million annual gross sales. The Nursery Automation Index is a measure of the level of automation or mechanization currently being practiced in each nursery included in the regional survey (1). It shows the extent to which nurseries have currently automated or mechanized the various tasks involved in the production of horticulture products. A series of questions was asked to solicit the respondent's perceptions of the level, costs and labor requirements of every automation or mechanization used in every nursery visited.

1. How would you describe the level of automation in <nursery task> in your nursery?
2. If automated or mechanized, what type of automated system is used?
3. What was the cost of purchasing and installing the automation system?
4. How many workers are required to operate the equipment?

The level of mechanization of 15 different tasks performed by nurseries engaged in container production in the Gulf of Mexico region ranged from 0 to 50% (Table 1). About two-thirds of the container nurseries purchased premixed substrates. Current mechanization among container nurseries was limited to the following tasks: mixing container substrate - 35%, filling containers with substrate - 32%, transporting containers to field - 28%, fertilizer application - 19%, pesticide application - 26%, and irrigation application and management - 50%.

The level of mechanization of 10 different tasks performed by nurseries engaged in greenhouse production in the Gulf of Mexico region ranged from 0 to 57% (Table 2). About two-thirds of the greenhouse nurseries purchased premixed propagation media. The tasks that these nurseries performed with significant levels of mechanization included: media preparation - 28%, pot and/or tray filling - 32%, environmental control - 45%, fertilizer application - 36%, pesticide application - 29%, and irrigation application and management - 57%.

Significance to the Industry. Sustaining the growth of the nursery and greenhouse industry requires a steady supply of reliable workforce capable of performing several horticultural tasks including planting, cultivating, harvesting, and transplanting plants. In order to achieve higher labor productivity and a satisfactory work environment, nurseries can strive to automate or mechanize their operations fully or partially, depending on their own individual circumstances. The results of the survey will be further used to evaluate the socioeconomic impact of automation currently used in container nursery production and greenhouse plant propagation on work force, nursery and greenhouse characteristics, and use of labor, capital, pesticides, chemicals and computers. The results of the survey will also show the differences in production levels and sales attributable to the differences in the levels of automation in the major tasks performed in nursery and greenhouse operations in the region. It is expected that with this information, growers can make informed decisions regarding nursery and greenhouse automation that would be beneficial to the nursery business and to its workforce.

Literature Cited

1. Posadas, B.C., G.B. Fain, C.H. Coker, P.R. Knight, C. D.Veal, and R.Y. Coker. 2004. Socioeconomic Survey of Nursery Automation. Proceedings of the Southern Nursery Association Research Conference, 49: 306-309.

Table 1. Levels of mechanization among nurseries engaged in container production in the Northern Gulf of Mexico

	Nursery tasks	Number	Container production only	Both container and greenhouse nursery	Total
1	Mixing container substrate	16	0%	37%	35%
2	Filling containers with substrate	47	15%	38%	32%
3	Placing plant liners in containers	49	0%	9%	7%
4	Moving containers from potting to transport vehicle for movement within the nursery	46	3%	19%	15%
5	Transporting containers to field	45	28%	28%	28%
6	Removing containers from transport vehicle and placing in the field	46	8%	0%	2%
7	Spacing of plants and containers	51	4%	0%	1%
8	Picking plants up and loading onto transport vehicle at time of sale	51	13%	3%	6%
9	Removal of plants from transport vehicle and placing in holding area awaiting shipment	44	8%	3%	5%
10	Picking up plants from holding area or from transport trailers and loading onto delivery vehicles	46	5%	6%	7%
11	Jamming plants for winter protection	25	0%	0%	0%
12	Plant pruning	41	14%	5%	8%
13	Fertilizer application	55	14%	21%	19%
14	Pesticide application	55	15%	30%	25%
15	Irrigation application and management	53	44%	53%	50%

Table 2. Levels of mechanization among nurseries engaged in greenhouse production in the Northern Gulf of Mexico

	Nursery tasks	Number	Greenhouse only	Both greenhouse and container	Total
1	Media preparation	20	48%	21%	28%
2	Pot and/or tray filling	57	30%	33%	32%
3	Cutting and seed collection	51	0%	0%	0%
4	Cutting and seed preparation	51	0%	3%	2%
5	Sticking cuttings and planting seed	53	16%	5%	8%
6	Environmental control	55	50%	42%	45%
7	Harvesting and grading production	55	0%	0%	0%
8	Greenhouse fertilizer application	57	30%	39%	36%
9	Greenhouse pesticide application	55	30%	29%	29%
10	Irrigation application and management	55	55%	59%	57%

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