



Socioeconomic Characteristics of Workers in
Nurseries and Greenhouses
in the Northern Gulf of Mexico States



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INTRODUCTION

The Mississippi Agricultural and Forestry Experiment Station (MAFES) and the U.S. Department of Labor (DOL) undertook the research program *Enhancing Labor Performance of the Green Industry in the Gulf South*, which included this socioeconomic survey of nursery automation in the northern Gulf of Mexico. The survey consisted of eight parts: workers' demographic characteristics, nursery characteristics, nursery automation, greenhouse automation, labor and capital markets, pesticide and chemicals, working conditions, and respondents' characteristics (Posadas et al., 2004). Overall goals were to develop a socioeconomic profile of horticulture workers and to evaluate the impact of automation on their employment, earnings, safety, skill levels, and retention rates. However, the scope of this bulletin was limited to the socioeconomic characteristics of nursery and greenhouse workers in the northern Gulf of Mexico states. Posadas et al. (2006) evaluated the socioeconomic impact of nursery and greenhouse automation and mechanization in the northern Gulf of Mexico states. The operational characteristics of the participating nurseries and greenhouses and the socioeconomic characteristics of operators and managers are described in MAFES Bulletin 1184 (Posadas, et al., 2010).

The nursery and greenhouse industry in the northern Gulf of Mexico states contributed significant levels of revenues, employment, earnings, and indirect business taxes to the regional economy.

Results of the study conducted by Hall et al. (2005) estimated that the annual economic impact of the industry in the region totaled \$615.9 million. Of this total, Alabama contributed \$411 million; Mississippi, \$55.6 million; and Louisiana, \$149.3 million. The industry provided 6,753 jobs to the region's labor force and generated \$17.1 million in indirect business taxes to local and state governments.

The nursery and greenhouse industry is often described as one of the fastest growing sectors of U.S. agriculture and is inherently labor-intensive (Regelbrugge, 2007). To sustain robust growth in the industry, continuous improvements in the skills of the workforce and year-round worker availability are necessary. These workers perform varied functions and are subjected to different working conditions.

The specific objectives of this survey were to compare worker socioeconomic characteristics, working conditions, worker training, safety and retention, and labor cost distribution among nurseries and greenhouses in the northern Gulf of Mexico states. Understanding the socioeconomic characteristics of these workers provides nursery and greenhouse operators, managers and owners, and horticulture researchers and specialists better insights into the underlying human dimensions of the industry. Improved working conditions, better training opportunities, and satisfactory benefits and incentives will greatly enhance worker retention and recruitment.

MATERIALS AND METHODS

We conducted the socioeconomic survey among wholesale nurseries and greenhouses in Mississippi, Alabama, and Louisiana between December 2003 and March 2005. The Mississippi Department of Agriculture and Commerce (Spell et al., 2002), Alabama Department of Agriculture and Industries (Sparks, et al., 2003), and Louisiana Department of Agriculture and Forestry (Strain, et al., 2003) provided official lists of certified nurseries. From these official lists, as well as industry association buyers' guides (Louisiana Nursery and Landscape Association, 2005), online buyers' guides (Alabama Nursery and Landscape Association, 2008), and Extension Service reference guides (Johnson and Wells, 2007), we identified the wholesale growers in each state. Using a random number generator, we generated 50 individual integers from 1–N, where "N" equals the number of wholesale growers identified in each state. We used these integers to number the growers from 1–N.

We mailed individual letters of introduction to the 50 selected nurseries and greenhouses in each state in advance to provide them with background information regarding the regional survey. Telephone calls followed the letters to determine the growers' willingness to participate and their availability for the interviews. A

research associate, who was hired for this purpose, conducted all personal interviews (Posadas et al., 2004). Survey respondents were the owners or operators of the selected nurseries and greenhouses. These efforts resulted in 87 completed nursery automation survey forms (NASF).

The socioeconomic database contained labor, technical, and economic variables concerning the nurseries and greenhouses (Posadas et al., 2005). The workers' demographic characteristics included race, age, gender, and formal education completed. Nursery working conditions included working hours, peak and slack months, access to rest and lounging areas, housing benefits, dental and medical insurance, retirement benefits, and sanitation facilities and drinking water. The socioeconomic characteristics were compared by type of operations and annual gross sales by using the General Linear Model multivariate procedure (SPSS 14.0 for Windows, 2005). The types of operations consisted of nursery only, greenhouse only, and mixed nursery and greenhouse operations. The annual gross sales categories included small (less than \$250,000), medium (\$250,000–499,999), large (\$500,000–999,999), and very large (\$1,000,000 and more) operations (Hoppe et al., 2007).

RESULTS AND DISCUSSION

Worker Characteristics

Number of workers — The number of workers employed by the nurseries and greenhouses that participated in the survey included permanent and part-time workers. In this bulletin, a permanent or full-time worker was considered as one full-time equivalent (FTE), while a part-time worker was considered as one-half FTE. On average, each nursery or greenhouse employed 7.1 workers or 5.9 FTEs (Tables 1–2). However, the total number of workers and FTEs varied significantly by type of operation and annual gross sales. The mixed operations and large nurseries and greenhouses employed more workers than the other categories.

Worker race — On average, Caucasians made up 69% of all the workers employed in each nursery or greenhouse (Tables 1–2). The second largest group of

employees was of Hispanic origin (18.5%). About 11.1% of all workers employed were African-American. When viewed by type of operation, significantly more Caucasian workers were employed by greenhouse-only operations (Table 1). Small- and medium-sized nurseries and greenhouses significantly employed more Caucasian workers (Table 2). Large nurseries or greenhouses hired significantly more Hispanic workers.

Worker age — About one-third of all nursery and greenhouse workers were 40 to 49 years old (Table 1). The youngest age group (18- to 29-year-olds) made up 25.8% of all workers. Mixed operations significantly hired more workers in the younger age group. Greenhouse-only operations tended to hire more 40- to 49-year-old workers. Medium and large nurseries or greenhouses employed significantly more 18- to 29-

year-old workers (Table 2). Most workers in the small nurseries or greenhouses were 40 to 49 years old.

Worker gender — About one-third of all workers employed by nurseries and greenhouses were female (Tables 1–2). There were no observed significant variations in worker gender by type of operations or by annual gross sales.

Worker education — High school graduates comprised 46.3% of all workers employed by nurseries and greenhouses, followed by workers with less than high school education (24.3%), four-year college degrees (16.7%), associate degrees (10.1%), and advanced degrees (2.8%) (Tables 1–2). The proportion of college-educated workers was highest among nursery-only operations. On the other hand, larger nurseries or greenhouses hired significantly more workers with less than high school education.

Non-English-speaking and overseas migrant workers — On average, about 21.5% of all workers employed by the participating nurseries and greenhouses were non-English speakers (Tables 1–2). We observed no significant variations in the proportion of non-English-speaking workers among the different types of operations. When compared by annual gross sales, nurseries or greenhouses with annual gross sales exceeding \$500,000 hired more non-English speakers. The proportion of workers who were overseas migrants during peak season also did not vary much among the three nursery types (Tables 1–2). However, nurseries and greenhouses with annual gross sales more than \$1,000,000 tended to hire more overseas migrant workers.

Table 1. Socioeconomic characteristics of workers employed by nurseries and greenhouses in northern Gulf states by type of operation.

Item	Nursery only	Greenhouse only	Mixed operations	Total
Number of workers employed:				
Permanent workers	3.3	2.7	6.4	4.7
Part-time workers *	0.8 a	0.8 a	4.1 b	2.4
Total workers	3.5 a	4.0 a	10.5 b	7.1
Full-time equivalent *	3.6 a	3.1 a	8.5 b	5.9
Race composition of workers (%):				
Caucasian *	72.8 ab	86.6 b	57.6 a	69.0
African American	15.5	1.6	14.0	11.1
Asian/Pacific Islander	0.0	0.0	0.6	0.3
Native American	0.0	4.6	1.2	1.8
Hispanic	14.2	7.3	26.6	18.5
Age composition of workers (%):				
18–29 years *	20.5 a	11.1 a	36.2	25.8
30–39 years	14.3	10.7	18.2	15.2
40–49 years *	34.9 a	58.5 b	18.5 a	33.0
50–59 years	14.4	9.2	20.1	15.8
60–69 years	16.0	3.2	6.4	7.9
70 years and older	2.5	7.3	0.7	7.9
Gender of workers (%):				
Female	24.2	30.7	39.7	33.6
Formal education completed (%):				
Less than high school	24.0	17.4	28.1	24.3
Completed high school	41.4	45.1	49.4	46.3
Associate degree	2.5	18.6	9.3	10.1
College degree *	32.1 a	13.6 b	11.7 b	17.1
Advanced degree	2.5	5.3	1.6	2.8
Non-English speaking workers (%)	19.6	28.1	19.3	21.5
Overseas migrant workers (%)	11.8	3.6	16.3	12.0

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at P ≤0.05.

Table 2. Socioeconomic characteristics of workers employed by nurseries and greenhouses in northern Gulf states by annual gross sales.

Item	<\$250,000	\$250,000–\$499,999	\$500,000–\$999,999	\$1,000,000 and above	Total
Number of workers employed:					
Permanent workers *	1.7 a	4.0 a	5.5 a	19.1 b	4.7
Part-time workers *	0.8 a	1.3 a	4.4 b	9.7 c	2.4
Total workers *	2.4 a	5.3 a	9.9 b	28.8 b	7.1
Full-time equivalent *	2.1 a	4.7 a	7.7 b	24.0 b	5.9
Race composition of workers (%):					
Caucasian *	76.9 b	76.8 b	48.2 a	39.9 a	69.0
African American	11.3	8.7	10.8	14.3	11.1
Asian/Pacific Islander	0.0	0.0	2.4	0.0	0.3
Native American	3.2	0.0	0.0	0.0	1.8
Hispanic *	9.8 a	14.5 a	38.6 b	45.8 b	18.5
Age composition of workers (%):					
18–29 years *	15.1 a	33.1 ab	52.7 b	37.5 b	25.8
30–39 years	10.1	18.4	23.0	26.3	15.2
40–49 years *	44.4 b	21.0 ab	9.3 a	22.5 ab	33.0
50–59 years	19.2	12.5	12.4	8.8	15.8
60–69 years	9.0	11.3	4.0	0.8	7.9
70 years and older	3.2	3.8	2.2	0.5	2.9
Gender of workers (%):					
Female	37.0	20.5	34.2	38.2	33.6
Formal education completed (%):					
Less than high school *	15.8 a	30.1 ab	47.6 b	31.5 ab	24.3
Completed high school	48.6	39.4	40.7	52.6	46.3
Associate degree	14.9	6.3	1.5	2.5	10.1
College degree	17.5	22.4	10.3	13.5	17.1
Advanced degree	4.3	1.8	0.0	0.3	2.8
Non-English speaking workers (%)	19.4 a	9.1 a	26.7 ab	40.4 b	21.5
Overseas migrant workers (%)	4.4 a	7.5 a	8.3 a	46.8 b	12.0

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at P ≤0.05.

Table 3. Working hours and gross wage rate in nurseries and greenhouses in northern Gulf states by type of operation.

Working hours	Nursery only	Greenhouse only	Mixed operations	Total
Hours per day				
Peak season *	8.0 a	9.5 b	9.4 b	9.1
Slack season	6.3	6.9	7.5	7.1
Hours per week				
Peak season	50.5	52.2	51.5	51.5
Slack season	34.6	34.9	37.1	36.1
Gross wage rate (\$/hour)	7.92	8.39	7.70	7.89

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at P ≤0.05.

Working Conditions

Working hours, wages, and peak months — On average, nursery and greenhouse employees worked overtime (9.1 hours a day, 51.5 hours per week) while performing assigned tasks during peak months and 7.1 hours a day (36.1 hours per week) during slack months (Tables 3–4). The greenhouse-only and the mixed nursery and greenhouse operations reported longer daily working hours during peak months. Medium and large nurseries or greenhouses reported longer working hours during slack months. The gross wage rate averaged \$7.89 per hour, and there were no significant variations observed by type of operations or by annual gross sales.

When asked to specify which months they considered to be peak or slack, individual nursery and greenhouse operators had different responses. However, all participating growers considered February–May to be a peak period. Nursery-only operators reported a five-month peak season that starts in February and ends in June (Tables 5–6). Greenhouse-only operators reported a seven-month peak season that begins in November and ends in May. The mixed nursery and greenhouse operators reported a short peak season between March and May. Similar peak periods generally beginning in February and ending in May were reported by nurseries and greenhouses with different annual gross sales.

Table 4. Working hours and gross wage rate in nurseries and greenhouses in northern Gulf states by annual gross sales.

Working hours	<\$250,000	\$250,000– \$499,999	\$500,000– \$999,999	\$1,000,000 and above	Total
Hours per day					
Peak season	8.7	9.1	9.4	10.2	9.1
Slack season *	6.3 a	7.7 ab	7.2 ab	8.3	7.1
Hours per week					
Peak season	46.8	54.0	53.9	58.3	51.5
Slack season *	30.8 a	38.5 ab	38.4 ab	44.9 b	36.1
Gross wage rate * (\$/hour)	7.78 ab	8.18 ab	7.08 a	8.55 b	7.89

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at P ≤0.05.

Table 5. Peak production months reported by nurseries and greenhouses in northern Gulf states by type of operation.

Month	Nursery only	Greenhouse only	Mixed operations	Total
	%	%	%	%
January *	44	73	26	43
February *	61	86	44	60
March	89	96	87	90
April	94	86	95	92
May	89	77	80	81
June	56	41	33	41
July *	44	14	18	23
August	39	18	13	20
September	39	14	23	24
October	39	27	23	28
November *	33	50	15	29
December *	33	55	15	30

Numbers in bold (≥50%) indicate peak months.
* Significant at P ≤0.05.

Table 6. Peak production months reported by nurseries and greenhouses in northern Gulf states by annual gross sales.

Month	<\$250,000	\$250,000– \$499,999	\$500,000– \$999,999	\$1,000,000 and above	Total
	%	%	%	%	%
January	51	40	50	20	45
February	59	80	70	40	62
March	93	93	80	80	90
April	95	87	80	100	92
May	85	67	70	90	80
June	44	27	20	50	38
July	24	27	0	20	21
August	17	20	10	30	18
September	27	20	10	20	22
October	27	40	20	20	28
November	27	40	50	10	30
December	34	33	50	0	32

Numbers in bold ($\geq 50\%$) indicate peak months.
 * Significant at $P \leq 0.05$.

Table 7. Working conditions in nurseries and greenhouses in northern Gulf states by type of operation.

Item	Nursery only	Greenhouse only	Mixed operations	Total
Percent of workers with rest and lounging areas *	100 b	83 a	97 b	94
Percent of workers with housing benefits	7	3	24	15
Percent of workers with dental and medical insurance	7	6	9	8
Percent of workers with retirement benefits	0	6	18	10
Percent of workers with sanitation facilities and drinking water	100	94	95	96

* Significant at $P \leq 0.05$.
 Means in the same row with different letters are significantly different at $P \leq 0.05$.

Table 8. Working conditions in nurseries and greenhouses in northern Gulf states by annual gross sales.

Item	<\$250,000	\$250,000– \$499,999	\$500,000– \$999,999	\$1,000,000 and above	Total
Percent of workers with rest and lounging areas	95	100	80	100	94
Percent of workers with housing benefits	14	7	19	28	15
Percent of workers with dental and medical insurance *	2 a	7 a	10 a	29 b	8
Percent of workers with retirement benefits *	3 a	13 a	10 a	39 b	10
Percent of workers with sanitation facilities and drinking water	92	100	100	100	96

* Significant at $P \leq 0.05$.
 Means in the same row with different letters are significantly different at $P \leq 0.05$.

Rest areas, sanitation facilities, and drinking water — About 94% of all the workers in the participating nurseries and greenhouses had access to rest and lounging areas (Tables 7–8). The nursery-only and mixed operations offered statistically greater access to rest and lounging areas. We observed no significant differences among nurseries and greenhouses with different annual gross sales. About 96% of all the workers had access to sanitation facilities and drinking water (Tables 7–8). There were no significant differences among different types of operations and different annual gross sales.

Insurance, retirement, and housing benefits —

Approximately 8% of the nursery and greenhouse workers have employer-provided dental and medical insurance (Tables 7–8). Nurseries or greenhouses with annual gross sales of \$1,000,000 or more were significantly more likely to provide dental and medical insurance.

About 10% of all workers had employer-provided retirement benefits (Tables 7–8). Significantly more

workers (23.95%) received retirement benefits from nurseries or greenhouses with annual gross sales in excess of \$1,000,000.

Approximately 15% of all workers received housing benefits (Tables 7–8). There were no significant differences in the percent of workers provided with housing benefits by type of operation or annual gross sales.

Worker Training, Retention, and Safety

Horticultural training, retention, and recruitment — Participating nurseries and greenhouses provided training on basic horticultural skills to 38% of their workers (Tables 9–10). The basic training period for the new workers averaged about 7 days. The retention rate — percentage of workers employed by the same operation in two consecutive years — averaged 88%. We observed some statistical differences in worker retention rates among nurseries or greenhouses with different annual gross sales.

Table 9. Worker horticultural training and retention in nurseries and greenhouses in northern Gulf states by type of operation.

Item	Nursery only	Greenhouse only	Mixed operations	Total
Percent of workers provided training on basic horticultural skills	27	24	50	38
Length of basic training period for new workers (days)	5	3	10	7
Pct. of workers employed in the same nursery during the last two years	93	85	85	87

Table 10. Worker horticultural training and retention in nurseries and greenhouses in northern Gulf states by annual gross sales.

Item	<\$250,000	\$250,000–\$499,999	\$500,000–\$999,999	\$1,000,000 and above	Total
Percent of workers provided training on basic horticultural skills	34	29	40	67	38
Length of basic training period for new workers (days)	5	5	14	13	7
Pct. of workers employed in the same nursery during the last two years *	88 ab	97 b	68 a	83 ab	88

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at ≤0.05.

Approximately 55% of the participating growers did not hire migrant workers. For those who did hire migrants, the most widely used recruitment method was existing teams of migrant workers who hired other migrants. Growers also used employment agencies to hire migrant workers.

Chemical and pesticide application — Participating nurseries and greenhouses sent about 30% of their workers for formal training on chemical and pesticide application (Tables 11–12). The medium and very large nurseries and greenhouses tended to send significantly more of their workers to formal chemical and pesticide application training.

Almost all of the nursery and greenhouse workers (97%) were aware of the danger associated with exposure to chemicals and pesticides (Tables 11–12). The level of awareness of the danger was the same across the different types and sizes of nurseries and greenhouses.

Participating nurseries and greenhouses reported that 33% of all the workers were engaged in handling chemicals and pesticides (Tables 10–11). Nursery-only (47%) and greenhouse-only (36%) operations tended to employ more of their workers in chemical and pesticide application than the mixed nurseries and greenhouses (24%).

Table 11. Worker pesticide and chemical application training and safety in nurseries and greenhouses in northern Gulf states by type of operation.

Item	Nursery only	Greenhouse only	Mixed operations	Total
Percent of workers sent for formal chemical/pesticide application training	30	31	25	27
Percent of workers aware of danger associated with exposure to chemical/pesticide	97	100	96	97
Percent of workers engaged in the handling of chemical/pesticide *	47 b	40 b	0	34
Percent of workers involved in chemical/pesticide-related injuries/illness	0.0	0.0	0.7	0.3
Percent of workers handling chemical/pesticide equipped with personal protective equipment	94	96	92	94
Number of work-related injuries reported	0.3	0.2	0.6	0.4
Man-hours lost due to work-related injuries	16	1	16	12

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at P ≤0.05.

Table 12. Worker pesticide and chemical application training and safety in nurseries and greenhouses in northern Gulf states by annual gross sales.

Item	<\$250,000	\$250,000–\$499,999	\$500,000–\$999,999	\$1,000,000 and above	Total
Percent of workers sent for formal chemical/pesticide application training *	16 a	54 b	8 a	58 b	27
Percent of workers aware of danger associated with exposure to chemical/pesticide	95	100	100	100	97
Percent of workers engaged in the handling of chemical/pesticide *	45 b	27 ab	19 ab	9 a	34
Percent of workers involved in chemical/pesticide-related injuries/illness	0.6	0.0	0.0	0.0	0.3
Percent of workers handling chemical/pesticide equipped with personal protective equipment	90	96	100	100	94
Number of work-related injuries reported *	0.0 a	0.5 a	0.1 a	2.7 b	0.5
Man-hours lost due to work-related injuries (hr) *	0 a	3 a	1 a	93 b	12

* Significant at P ≤0.05.
Means in the same row with different letters are significantly different at ≤0.05.

The percentage of workers who handled chemicals and pesticides was higher among small nurseries and greenhouses (45%) as compared with medium and large operations. A majority of the workers handling chemicals and pesticides (94%) were equipped with personal protective equipment.

Work-related injuries — Participating nurseries and greenhouses reported a negligible number of workers involved in chemical- and pesticide-related injuries and illnesses (Tables 11–12). The number of work-related injuries reported the year before the survey averaged 0.5 injuries per nursery or greenhouse. Despite the low incidence of injuries reported, the number of man-hours lost due to work-related injuries last year averaged 13 man-hours per nursery or greenhouse. The very large nurseries and greenhouses reported more man-hours lost due to injuries (93 man-hours) as compared with the small and medium operations. The most common injuries reported by participating nurseries and greenhouses were back strains and cut fingers.

Functional Distribution of Labor Costs

The major categories of labor applications for all nurseries and greenhouses were harvesting and grading (21%), general maintenance (18%), pot and tray filling (14%), sticking cuttings and planting seed (11%), fertilizer and pesticide application (10%), and

irrigation application and management (10%) (Tables 13–14). Approximately 31% of the nurseries reported preparing propagation media, while 34% of the greenhouses prepared propagation media. Most of the participating nurseries and greenhouses purchased the propagation media needed in their operations.

Among nursery-only operations, the major categories of labor applications were general maintenance (30%), harvesting and grading (23%), fertilizer and pesticide application (16%), sticking cuttings and planting seed (8%), and irrigation application and management (7%).

For greenhouse-only operations, the bulk of labor applications were on harvesting and grading (24%), pot and tray filling (18%), sticking cuttings and planting seed (16%), general maintenance (15%), irrigation application and management (7%).

Labor usage among mixed nursery and greenhouse operations was concentrated on harvesting and grading (19%), pot and tray filling (15%), general maintenance (14%), irrigation application and management (12%), and sticking cuttings and planting seed (10%).

Except on cutting and seed collection and preparation, we observed only limited significant variations in labor applications among nurseries and greenhouses with different annual gross sales.

Table 13. Percent distribution of labor costs in nurseries and greenhouses in northern Gulf states by type of operation.

Tasks	Nursery only	Greenhouse only	Mixed operations	Total
General maintenance *	30 b	15 a	14 a	18
Media preparation	4	3	5	4
Pot and/or tray filling *	6 a	18 b	15 b	14
Cutting/Seed collection *	1 a	1 a	5 b	4
Cutting/Seed preparation *	1 a	4 b	5 b	4
Sticking cuttings/planting seed *	8 a	16 b	10 ab	11
Environmental control	4	5	5	5
Harvesting and grading	23	24	19	21
Fertilizer/Pesticide application	16	7	8	10
Irrigation application/management	7	7	12	10

* Significant at $P \leq 0.05$.

Means in the same row with different letters are significantly different at ≤ 0.05 .

Table 14. Percent distribution of labor costs in nurseries and greenhouses in northern Gulf states by annual gross sales.

Tasks	<\$250,000	\$250,000– \$499,999	\$500,000– \$999,999	\$1,000,000 and above	Total
General maintenance	21	12	18	14	18
Media preparation	4	6	3	3	4
Pot and/or tray filling	14	9	15	16	14
Cutting/Seed collection *	2 a	2 a	8 b	3 a	3
Cutting/Seed preparation *	4 a	3 a	10 b	2 a	4
Sticking cuttings/planting seed	11	11	11	9	11
Environmental control	5	3	4	7	5
Harvesting and grading	20	25	16	25	21
Fertilizer/Pesticide application	9	13	8	11	10
Irrigation application/management	10	6	8	12	10

* Significant at $P \leq 0.05$.

Means in the same row with different letters are significantly different at $P \leq 0.05$.

SUMMARY AND IMPLICATIONS

Survey results among nursery and greenhouse growers in the northern Gulf of Mexico states revealed some insights into labor hiring decisions in the industry. Results also presented the status of working conditions of workers, training needs, recruitment, and retention. More than 70% of all the workers hired by the participating nurseries and greenhouses had a high school education or less. Nursery-only operations tended to hire more workers with college education. Large nurseries or greenhouses tended to hire more workers with less than high school education. More Caucasian employees worked at greenhouse-only operations and small and medium nurseries and greenhouses. Large nurseries or greenhouses tended to hire more Hispanic workers.

Although there were variations from grower to grower, the industry peak season covered the months starting in February and ending in May. During peak months, working hours averaged 9.1 hours a day or 51.5 hours per week. During slack months, workers averaged 7.1 hours a day or 36.1 hours per week. The average wage rate reported by nurseries and greenhouses was \$7.89 per hour. Most of the workers had access to rest and lounging areas, sanitation facilities,

and drinking water. Nurseries and greenhouses provided their workers limited housing benefits, dental and medical insurance, and retirement benefits.

Nurseries and greenhouses provided basic horticultural training to 38% of their new workers, averaging 7 days per nursery. The majority of employees worked in the same nursery or greenhouse during two consecutive years before the survey. Less than one-third of the workers received formal chemical and pesticide application training, while almost all of them were aware of the dangers associated with exposure to chemicals and pesticides. Although about a third of the workers handled chemicals and pesticides, there were few reports of chemical- or pesticide-related injuries or illnesses. Almost all of the workers handling chemicals or pesticides were equipped with personal protective equipment. The number of reported work-related injuries averaged less than one per nursery and involved about 13 lost man-hours.

Major labor applications included tasks associated with harvesting and grading, general maintenance, pot and tray filling, sticking cuttings and planting seed, fertilizer and pesticide application, and irrigation application and management.

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