

A Ten-Year Review of the Southeast U.S. Green Industry, Part II: *Addressing Labor Shortages and Internal and External Factors Affecting Business Strategies*

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INTRODUCTION

Agriculture can be a very labor-intensive industry. While some types of crops and livestock operations have become highly mechanized and have incorporated precision agriculture technologies in planting, fertilizing, and harvesting activities, specialty crops, including nursery crops, still rely heavily on manual labor. For example, planting, pruning, fertilizing, staking, weeding, harvesting and pulling orders are often done manually by workers due to the diversity of products (e.g., size, shape), fragility of the product, and low consumer tolerance for aesthetic damage on plants. Labor accounts for approximately 40 percent of nursery production costs (Mathers et al., 2010; Hall & Ingram, 2014). However, a business model that depends on maintaining the current labor force may not be successful. Current surveys reveal that a shrinking workforce is becoming a greater barrier for producers. For example, Tennessee growers report that labor-related challenges including hiring and retaining domestic employees are increasing. A common refrain from Tennessee nursery owners is that locally sourced employees routinely do not return from lunch on their first day, if they show up at all. Tennessee producers' experiences are not unique. Nationally, nearly 80 percent of nurseries indicated that labor is their greatest challenge, and more than 50 percent stated the lack of a qualified workforce limited their ability to fill vacant positions (McClellan, 2018). Given the persistent and widespread labor scarcity that U.S. nurseries are facing, growers may need to adopt strategies that improve efficiency and production to best utilize their limited workforce.

In Part I of this series of publications, [**A Ten-Year Review of the Southeast U.S. Green Industry, Part I: Labor and Firm Characteristics**](#), we explored annual sales, product types and workforce demographics. In Part II, we discuss what actions nurseries are taking to address the labor shortage and the role other factors and issues have on business decisions that could affect the future sustainability of the U.S. green industry. Growers and other industry stakeholders can use these results to evaluate strategies to address and alleviate labor issues. These results may also help decision makers within nurseries identify solutions, including technologies that align with their unique production situations. The results could also help elected officials, state and federal agriculture entities, and trade associations identify opportunities to develop new, and expand existing, cost share programs and similar initiatives that support nursery producers.

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DATA AND ANALYSIS

This publication addresses firms' responses to labor-related questions from two surveys, the National Green Industry Survey and the LEAP Nursery Labor survey. The complete description of the two surveys and the data collection process are available in Part I of this series, UT Extension publication "[A Ten-Year Review of the Southeast U.S. Green Industry, Part I: Labor and Firm Characteristics W 1026](#)." In short, results from the National Green Industry Survey are reported for the U.S., a five-state region (Georgia, Kentucky, North Carolina, South Carolina, and Tennessee), and Tennessee only. While Part I reports National Green Industry Survey results across three survey periods, 2009, 2014 and 2019, Part II only reflects data collected in 2019 (for the 2018 growing season), given that the labor-specific questions were not added until the 2019 survey.

The LEAP Nursery Labor and Automation Survey was conducted to further delve into actions taken by green industry firms to address labor challenges. The LEAP Nursery Labor and Automation Survey occurred in the spring of 2020 and surveyed U.S. nursery firms. A total of 189 nursery firms responded to the survey, of which 154 (81.5 percent of the sample) answered the question focusing on actions taken to address labor issues. The mean reported annual sales of participating nurseries was \$10.7 million, with 42 percent of the sample from the southeast U.S. Considering the results from both the National Green Industry Survey and the LEAP Nursery Labor and Automation Survey provides a more comprehensive assessment of the current green industry landscape and how the industry is reacting to labor challenges.

ACTIONS TO ADDRESS LABOR ISSUES

The National Green Industry Survey responses indicated the actions U.S. green industry firms were taking to address labor shortages during 2018 nationally, in the five-state region, and at the state level for Tennessee (Table 1). On a national level, the largest proportion of firms (40 percent) was using higher wages to address labor shortages. Thirty-four percent of growers who responded were doing nothing, 25 percent were adopting labor-saving technologies, 22 percent were training employees to improve skills, 13 percent indicated other actions, and 9 percent were adding employee benefits. The five-state region had a slightly higher participation rate in actions to address labor issues than the total sample but their responses followed a similar trend. In Tennessee, approximately 45 percent of the twenty-seven respondents indicated they were not taking any additional actions compared to 34 percent nationally and 46 percent for the five-state region. Tennessee growers addressed labor scarcity with other strategies in 2018 relative to the national results. For instance, 51 percent of participating Tennessee firms were paying higher wages, 48 percent were adopting labor-saving technologies, 47 percent were training employees to improve skills, 32 percent indicated other actions, and 45 percent were adding employee benefits.

The LEAP Nursery Labor and Automation Survey asked growers about their use of a similar set of labor actions as did the National Green Industry Survey but included additional actions (e.g., production practice changes such as reducing labor-intensive crops, Lean Flow processing) to better understand what the "other" category may have represented in the 2019 survey (Figure 1). Responses in 2020 indicated that 26 percent of nurseries were not experiencing labor shortages and, as a result, were likely doing nothing to address labor issues (doing nothing was selected by 34 percent of respondents in the 2019 survey). Like in the 2019 survey, the top three actions in 2020 were comparable and included paying higher wages (66 percent), adopting labor-saving technologies (56 percent), and training employees to improve skills (45 percent). While an identical set of growers was not surveyed both years, over the 2-year period, the number of nurseries responding that they were paying higher wages, adopting labor-saving strategies, and training employees to improve skills increased 65 percent, 124 percent, and 105 percent, respectively, suggesting that the available and existing labor force has become even more scarce over this short time period. Interestingly, a fair proportion of the sample indicated they were adjusting their production strategies to address labor issues. For instance, 38 percent indicated that they were reducing the production of labor-intensive crops, 28 percent were adopting lean flow processing, 23 percent were putting expansion plans on hold, 21 percent increased outsourcing, and 14 percent were scaling back their operations. In addition to adjusting

production practices, they also were implementing employee-focused strategies such as adding benefits (29 percent), applying for or already using H-2A workers (27 percent), or having high-skill employees doing more low-skill or manual labor (27 percent). Approaches nurseries are taking appear to fall into two main categories: those that allow nurseries to function more efficiently or maintain production with a limited workforce and those designed to improve employee recruitment and retention to maintain as robust of a workforce as is possible. Together these actions aid in improving the employee experience while increasing productivity.

As a point of comparison, another study conducted in 2020 (for the 2019 growing season), surveyed 153 Tennessee nursery and greenhouse producers about their labor needs (Velandia et al., 2021). In that study, paying higher wages was the primary action taken by growers (47 percent of the sample), followed by adopting mechanization (32 percent), nothing (29 percent), training employees (23 percent), adopting labor saving practices (18 percent), other actions (14 percent), moving to H-2A labor (13 percent), and adding benefits (10 percent). The top two actions were similar across the three studies and included paying higher wages as the primary action taken by green industry firms, followed by adopting labor-saving technologies. Training employees was also in the top four options across all three studies suggesting reliability of the top results. However, in Velandia et al (2021), benefits were selected by the fewest portion of participants, with just 10 percent selecting this strategy, conversely, for the LEAP survey and the Tennessee responses to the National Green Industry survey, benefits were the fourth most frequently selected action and were selected by 45 percent and 29 percent of respondents, respectively. Likely these variances reflect sampling differences between the the three studies, as well as changes in labor availability. Annual sales were \$2.85 million for the National Green Industry Survey and \$10.7 million for the LEAP survey, but just \$673,224 for the Tennessee survey reported in Velandia et al (2021). Benefits are expensive and re-occurring, thus nurseries with larger annual sales may be better able to afford this strategy to attract and retain employees.

Table 1. Actions Taken by U.S. Green Industry Firms in 2018 to Address Labor Shortages.

	U.S. (n=1,210)		FIVE-STATE REGION (GA, KY, NC, SC, TN) (n=172)		TENNESSEE (n=27)	
	n	Percent of sample	n	Percent of sample	n	Percent of sample
Adding employee benefits	109	9%	53	31%	12	45%
Other	157	13%	53	31%	9	32%
Training employees to improve skills	266	22%	76	44%	13	47%
Adopting labor-saving technology	303	25%	77	45%	13	48%
Nothing	411	34%	79	46%	12	45%
Paying higher wages	484	40%	84	49%	14	51%

Note: Participating firms could select all that apply meaning the number of observations is higher than the sample sizes.

FACTORS IMPACTING BUSINESS STRATEGIES

Nurseries participating in the 2019 National Green Industry Survey rated the importance of several external and internal factors on business decisions (1=not at all important; 4=very important). Regardless of the firm’s location, all firms indicated that market demand and weather uncertainty were the most important factors influencing future business decisions (Table 2). This is understandable as both can lead to catastrophic outcomes, from hurricanes and tornados destroying nurseries. Also, nursery owners have limited ability to predict or prevent these factors from occurring. However, actions can be taken to minimize the potential risks (e.g., by increasing

Actions to Address Labor Shortages in 2020 (n=154)

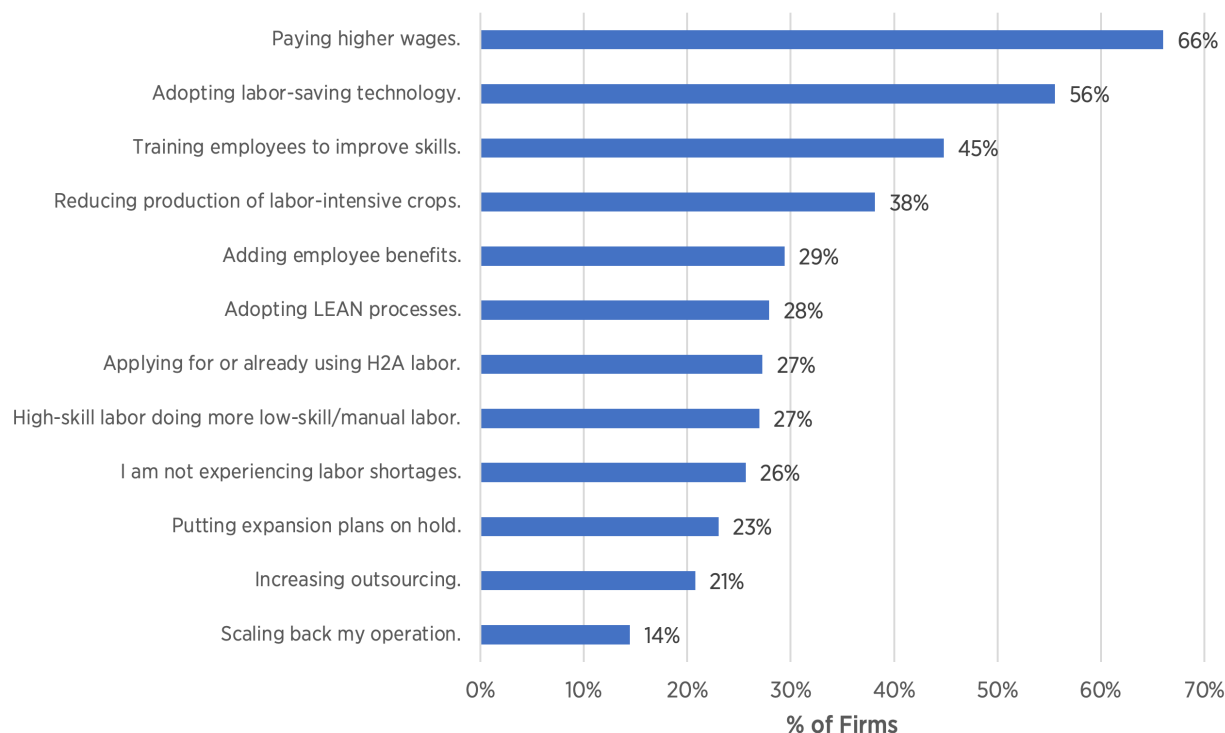


Figure 1. U.S. Nursery Firms’ Actions to Address Labor Shortages in 2020 (n=154)

insurance coverage and diversifying production). Participants rated their own managerial expertise, labor costs, competition/price undercutting, and ability to hire competent hourly employees as moderately important (mean scores of 2.6 – 2.8). The remaining factors were categorized as slightly important, with water supply, environmental regulations, and other governmental regulations all receiving a rating of 2.4. In the five-state region, similar trends were observed for most of the factors with the exception of water supply gaining more importance. Tennessee participants also rated water supply as more important as well as environmental and other governmental regulations. Responses from growers in the five-state region and Tennessee related to the water supply may reflect a heightened awareness due to recent droughts (2007-2008, 2012, 2017, (NOAA, 2021)), water wars (Atlanta Regional Commission, 2021; Gaffney, 2019), and educational and research efforts (Clean Water³, 2021; Fulcher et al., 2014; Clark et al., 2014-2018) led by university faculty in this region.

Whether the nursery was primarily growing plants in containers or other (e.g., bare-root or balled and burlapped) impacted the relative importance of the different factors (Table 3). Among all nurseries responding to the survey, nurseries selecting “other” for their production type rated market demand, competition/price undercutting, land, environmental regulations and other governmental regulations as more important than container operations. Conversely, “other” operations rated the ability to hire competent management, debt capital and balance of power with suppliers/vendors as less important than container operations. Some of these results may imply more specialized, niche or smaller operations where some of these resources are not as much of an issue (e.g., relying on family labor instead of needing to hire management, etc.). In the five-state region, nurseries identifying as other rated labor costs, land, competition/price undercutting, environmental regulations and other governmental regulations as more important relative to container operations. In Tennessee, container operations viewed land availability and water supply as less important than other types of nurseries. While land availability may not be as critical for container nurseries because of the condensed nature of this production type with many plants per acre, it is surprising that they would not find water supply as equally or more important than nurseries employing other production types given that irrigation is necessary for container crops on a daily basis for much of the growing season.

Table 2. Importance Ratings of Factors Impacting Business for U.S. Green Industry Firms in 2018.

	U.S. (n=1,210)	FIVE-STATE REGION (n=172)	TENNESSEE (n=27)
<i>Factor</i>	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
Weather uncertainty	3.1	3.1	3.3
Land	2.2	2.3	2.3
Market demand	3.3	3.4	3.5
Labor costs	2.7	2.7	2.8
Water supply	2.4	2.5	2.6
Debt capital	2.1	2.2	2.2
Equity capital	2.1	2.2	2.2
Own managerial expertise	2.8	2.8	2.8
Competition/Price undercutting	2.6	2.6	2.7
Environmental regulations	2.4	2.4	2.5
Other government regulations	2.4	2.4	2.5
Ability to hire competent management	2.2	2.2	2.3
Ability to hire competent hourly employees	2.6	2.6	2.7
Balance of power with suppliers/vendors	2.0	2.1	2.1
Balance of power with buyers/customers	2.3	2.3	2.1

Note: Color indicates importance rating and corresponds with answer choices on the survey, where:
 Orange = greater than 3 “important,” Yellow = 2.5-2.9 “moderately important,” Light Blue = 2.0-2.49 “slight importance.”

Table 3. Importance Ratings of Factors Impacting Business for U.S. Green Industry Firms in 2018, by Operation Type.

Factor	U.S.		FIVE-STATE REGION		TENNESSEE	
	Container (n=823) Mean	Other Operations (n=387) Mean	Container (n=120) Mean	Other Operations (n=52) Mean	Container (n=16) Mean	Other Operations (n=11) Mean
Weather uncertainty	3.1	3.1	3.1	3.2	3.2	3.4
Land	2.1	2.5	2.1	2.6	2.0	2.6 *
Market demand	3.3	3.4	3.3	3.4	3.4	3.6
Labor costs	2.7	2.7	2.6	2.8	2.7	2.9
Water supply	2.4	2.4	2.5	2.6	2.3	2.8 *
Debt capital	2.1	2.0	2.2	2.2	2.0	2.3
Equity capital	2.1	2.0	2.2	2.3	2.1	2.4
Own managerial expertise	2.8	2.8	2.8	2.7	2.8	2.8
Competition/Price undercutting	2.6	2.7	2.6	2.7	2.6	2.7
Environmental regulations	2.3	2.5	2.3	2.6	2.3	2.7
Other government regulations	2.4	2.5	2.3	2.6	2.4	2.6
Ability to hire competent management	2.2	2.1	2.2	2.3	2.2	2.3
Ability to hire competent hourly employees	2.6	2.6	2.6	2.7	2.5	2.8
Balance of power with suppliers/vendors	2.1	1.9	2.2	2.0	2.4	1.7
Balance of power with buyers/customers	2.3	2.2	2.4	2.3	2.3	1.9

* indicates significance between container and other operations at the 5 percent level.

Note: Color indicates importance rating and corresponds with answer choices on the survey, where: Orange = greater than 3 "important," Yellow = 2.5-2.9 "moderately important," Light Blue = 2.0-2.49 "slight importance," Dark Blue = less than 2.0 "Less important."

SUMMARY AND DISCUSSION

An analysis of nurseries' actions to address labor issues in 2018 and 2020 demonstrated that most nurseries are experiencing labor issues. Often, the approaches nurseries are taking fall into two main categories: production-related actions, which improve or maintain efficiency with a limited workforce, or employee-related actions to improve recruitment, engagement and retention. Together, these actions target improving the employee experience and production efficiency.

Increasing employees' salaries was the primary action taken by firms regardless of survey year, and this strategy increased dramatically between the two survey years. Intuitively, this result makes sense given that increasing salaries is a relatively easy action and likely attracts new employees and encourages employee retention. Given that many of the actions to address labor issues were employee-related (e.g., increased salary, employee benefits, employee training), determining the best strategies to attract, retain and engage employees is vital when deciding on future labor-related strategies. For instance, adopting competitive salaries and benefits are good actions to attract employees to a firm. Beyond the employee's personal benefits, building a positive company culture through professional development opportunities, opportunities to advance and employee appreciation activities (e.g., training, events, recognition) also serve to bolster employee morale. Although not explicitly addressed here, company culture can greatly influence worker satisfaction and engagement. A strategy that combines both compensation and culture is a profit-based bonus program (Battersby, 2018). Nurseries that have successfully employed an annual bonus program report greater employee engagement and ongoing commitment to the success of the nursery. Investing in employee-related actions such as evaluating base pay and benefits, additional employee compensation, and opportunity for advancement will aid in recruiting new employees and is a great way to improve employee retention and retainment.

Beyond employee-related actions, firms also adopted a fair number of production-related actions to reduce their dependency on manual labor. The top three production-related actions included adopting labor-saving technologies, reducing production of labor-intensive crops, and adopting lean flow processing. The nursery industry is very dynamic, meaning not every production practice action is applicable for all growers. Automated nursery technologies allow growers to accomplish production practices with repetitive tasks (e.g., potting machines, automated pruning machines, conveyer belts) in a more labor-efficient manner while reducing the physical strain on workers. Likewise, lean flow-oriented systems can help nurseries eliminate inefficient aspects of processes and practices. Exploring production options that are complementary to the nurseries' existing practices and then assessing the financial factors related to those options (e.g., return on investment, initial costs, upkeep costs) are excellent ways to explore production-related actions to address labor issues.

Interestingly, a portion of the sample in each study indicated they are not taking action to address labor shortages (34 percent of the sample in the 2019 survey) or are not experiencing labor shortages (26 percent of the 2020 survey participants). Given the change in question framing, it is important to note that some of the higher percentages in the 2019 survey may reflect firms not experiencing labor shortages, or it may reflect firms that are unable or unwilling to take action on any of the listed strategies. Nurseries may not be taking action because they are not experiencing a labor shortage, or they have either an inability or unwillingness to invest in labor-efficient strategies or to even allocate staff time for investigating labor-efficient strategies/technologies. Growers who are not using these strategies may lack knowledge of where to start and the best actions to take for their firms. Inability to pursue listed strategies may also reflect insufficient profit or cash flow to invest in automation or to provide increases to employee salaries and may require that the business owners re-evaluate pricing based on an updated cost of production analysis. Growers who are reluctant to invest in labor-saving or -retaining strategies may benefit from participating in nursery tours where these strategies are featured and by educating themselves through the LEAP virtual automated nursery tours www.nurseryleap.com to learn more about the benefits of automation and how to mitigate risks in order to overcome their uncertainty. Similarly, nursery owners may feel they cannot afford to stop production in order to change current practices and would benefit from talking with nursery owners who have. Others may be approaching retirement or other business transitions such as adding a new production system (e.g., adding container production to a nursery currently producing only balled and burlapped plants), in which the future of the business is either undecided or in flux, among other potential explanations.

As nursery owners evaluate their options, they may want to consider a suite of strategies rather than relying on just one action and take into consideration the business pressures they are experiencing at that point in time and potentially in the future. Potential options could include those strategies that require minimal added expenses, such as those compatible with a nursery’s existing infrastructure. Table 4 below is provided to help nursery operators evaluate both positive and negative characteristics and consequences of select strategies. The assessment is based on the authors’ experience and judgment and will not reflect every nursery’s situation. Nursery owners should consider their own situation (e.g., firm-specific costs and benefits) to evaluate their options when using this tool. For example, even strategies projected to have positive business outcomes may have a negative impact on long-term sustainability if the cost of implementing these strategies is too high.

Table 4. A Decision Matrix of Labor Strategies and Potential Business Outcomes for U.S. Nursery Firms

<i>Labor Recruiting, Retaining or Saving Strategy</i>	BUSINESS OUTCOMES					
	<i>Impact on recruiting and maintaining current staff</i>	<i>Impact on company culture, worker morale</i>	<i>Impact on performing tasks more efficiently</i>	<i>Potential for significant expense</i>	<i>May require changes to nursery infrastructure</i>	<i>Impact on long-term sustainability of the business</i>
Paying higher wages, bonuses	+	+	.	Yes	No	+
Adopting labor-saving technology	+	+	+	Yes	Yes	+
Training employees to improve skills	+	+	+	No	No	+
Reducing production of labor-intensive crops	+	+	+	No	No	- ¹
Adding employee benefits	+	+	.	Yes	No	+
Adopting lean flow processes	+	+	+	Yes	Maybe	+
Applying for or already using H2A labor	+	+	.	Yes ²	Yes ²	+
High-skill labor doing more low-skill manual labor	-	-	.	No	No	-
Putting expansion plans on hold	./ -	./ -	.	No	No	-
Increasing outsourcing	+	+	+	No	No	+ / -
Scaling back my operation	-	-	.	No	No	-

+ = strategy is most likely to have a positive impact on this business outcome.

- = strategy is most likely to have a negative impact on this business outcome.

. = strategy is most likely to not have an impact.

¹ if these plants attract/retain customers or have high profit margins, shifting to less labor-intensive crops could hurt the long-term sustainability of the firm.

² housing and meeting other requirements.

Beyond the labor-related information, this publication also addresses factors influencing business decisions. Increased awareness of factors impacting the nursery industry can aid future business decisions. For instance, the external factors of weather uncertainty and market demand were both very important to nursery firms regardless of geographical location and type of operation (container, other). External factors cannot be controlled by the firm, but strategies can be employed to mitigate negative impacts or leverage positive impacts. Own managerial expertise and labor costs were the next highest important factors impacting businesses. Overall, when weighing potential strategies to address labor issues, firms need to consider their production area, typical weather patterns, products grown, potential markets, existing markets and other items that impact these factors. Consideration of these ideas can be used to proactively make strategic business decisions toward more sustainable growth.

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