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The Economic Feasibility of Adopting the Fertileeze Pro-35 Fertilizer Dispenser in Container Production: The Easy Tree Nursery Case Study

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1. Preface

Fertilizing nursery crops is an essential, labor intensive part of production. This publication aims to help nurseries understand the potential changes in expenses associated with transitioning from the manual method of spoon and bucket to the Pro-35 fertilizer dispenser to apply fertilizer as well as the factors influencing the economic feasibility of adopting this fertilizer dispenser in nursery container production.

This publication is not intended to be a definitive guide to production practices, but it helps estimate the physical and financial requirements of comparable nurseries considering switching their fertilizer application methods. Budget assumptions were adopted for this study based on a specific nursery example, but these assumptions may not fit every situation since production costs and revenue vary across nurseries depending on the following factors:

- Capital, labor
- Types of plants grown (e.g., container size, crop size and shape)
- Plant spacing (i.e., density of the crops)
- Cultural practices (e.g., pruning)
- Input prices (i.e., fertilizer prices)
- Sale prices
- Worker experience
- Size of the operation

To avoid unwarranted conclusions for any particular operation, readers must closely examine the assumptions made in this study and then adjust the expenses, revenues or both as appropriate for their operation.

2. Fertilizer Application in Container Nurseries

Nurseries typically apply fertilizer by one of three methods: incorporating, top dressing or dibbling. The incorporating method can only be used at planting, as it involves mixing the fertilizer into the substrate that is used to fill the containers. After planting, fertilizer must be either top dressed or dibbled. Top dressing is normally performed using a spoon and a bucket of fertilizer to apply fertilizer to the surface of the substrate. Dibbling is much less common than the other two methods and involves making a hole or holes in the substrate and depositing fertilizer into the hole(s). The incorporating method has the advantage of not spilling out of the container if a plant tips over, but no adjustment can be made after the application other than to leach excess fertilizer. With either top dressing or dibbling, the crop's health status, quality, growth rate and time remaining in the growing season can be assessed before applying fertilizer. Additionally, these methods allow the evaluation of previous and expected weather when deciding whether or not to add more fertilizer and, if so, how much and what type. However, fertilizer application by these methods can be labor intensive, and, for the top dress method, fertilizer can spill from the container if the container tips over.

3. Fertileeze Pro-35 Fertilizer Dispenser

The Pro-35 is a manual dispenser made of two sections of polyvinylchloride (PVC) pipe, one that fits within the other and a pump-style discharge mechanism that releases fertilizer. It has seven settings that allow the user to adjust the amount of fertilizer applied. There is approximately a five-gram difference between each setting. For example, when changing the setting from 0.5 to 1, the deposited fertilizer increases from 6 grams to 10 grams when using Florikan 18-6-8 fertilizer. The Pro-35 is fed from a removable gallon-size hopper at the end of the PVC pipe while the fertilizer is released from the other end.

Figure 1. *(Left) UT undergraduate student, Walker Harrell, is shown applying fertilizer with the Pro-35. The Pro-35 is made of two nested sections of tubing and a discharge mechanism and is fed from a removable plastic hopper. (Right) A clip is used to adjust the amount of fertilizer that is discharged from the applicator.*

4. Easy Tree Nursery

Easy Tree Nursery is a nursery located in Rock Island, Tennessee. Although this nursery has been in business since 1957, it has been under new ownership and management for less than one year. The nursery has 700 acres in total, with 250 acres in production. A large percentage of their sales (98 percent) is from the products they grow. They grow a variety of plants, including ornamental and shade trees, ornamental grasses, shrubs, and groundcovers. Hydrangeas are one of their top selling crops. Approximately 30 percent of their sales are to rewholesalers, 30 percent to landscapers and 40 percent to garden centers. More than half of their sales are container-grown crops (60 percent), with the rest being field (35 percent) and pot-in-pot (5 percent) crops. They produce from #1 (1 gallon) to #25 (25 gallon) containers and approximately 65 percent of their production is of #3 containers (3 gallons).

Easy Tree Nursery employed approximately 35 full-time workers in 2025, nine of whom were H-2A workers. They identified a lack of qualified and quality local labor as one of their biggest challenges. They indicated that even if they find experienced workers locally, the hours these workers can contribute to the business are relatively low.

5. Nursery Trial

Two experiments were conducted in order to test the Pro-35. One test used arborvitae Anna's Magic Ball® (*Thuja occidentalis*) in #2 size containers and Florikan 18-6-8 fertilizer, and the second used Virginia sweetspire 'Merlot' (*Itea virginica*) in #3 size containers and Florikan 12-6-6 fertilizer. The assistant production manager determined the amount of fertilizer that each crop needed to receive based on experience and the fertilizer labels. Two Pro-35s were calibrated for both Florikan 18-6-8 and Florikan 12-6-6. Once the calibration was complete, the settings on both Pro-35 dispensers were adjusted to apply the intended amount of fertilizer to Anna's Magic Ball®. Two nursery workers with fertilization responsibilities were each asked to fertilize the same number of plants using the manual method of a spoon and bucket and using a Pro-35 fertilizer dispenser. Fertilizer was weighed before and after each application was completed by each worker. Additionally, each worker's time to make each fertilizer application was recorded. Then the Pro-35 was emptied of the Florikan 18-6-8, and the process was repeated with Virginia sweetspire 'Merlot', beginning with adjusting the setting for the Florikan 12-6-6 fertilizer.

6. Other Sources of Information

Aside from the nursery trial data, we used information from input suppliers and data from the US Department of Labor to evaluate the potential economic impact of adopting the Pro-35 in container production. This data was used to develop a baseline of costs associated with container nursery production, and to analyze changes in this budget component related to transitioning from the manual method of spoon and bucket to the Pro-35. The various data used in this analysis and their sources are presented in Table 1.

The hourly minimum wage rate for manual labor used in this publication is $15.87/hour, which is the FY2025 Adverse Effect Wage Rate for Tennessee (Labor Consultants International, 2025). The Adverse Effect Wage Rate (AEWR) is the minimum hourly wage rate established by the US Department of Labor as the one that employers of H-2A workers should offer and pay. We added $2 per hour associated with additional costs related to the H-2A program

(e.g., housing, workers' compensation, application, filing, consulate, border stamp and agent fees, worker transportation, housing), based on conversations with the production manager of a Florida nursery and a farm operation in Tennessee. It is important to acknowledge that these additional costs will vary, depending on the number of workers housed, the type of housing provided, how long workers stay in the US, and where these workers are coming from (Velandia et al., 2023).

The cost of the Pro-35 fertilizer dispenser is estimated at $154.50 per dispenser when bought directly from the manufacturer. The dispenser is also available through other suppliers. Fertilizer cost is estimated at $65 per 50 lb bag, which is a typical amount a grower will pay for a controlled release fertilizer appropriate for these topdress applications when bought in bulk. The fertilizers used in this study have a 4-to-6-month longevity; include nitrogen, phosphorus and potassium; and have at least some micronutrients. Depending on the type and amount of fertilizer bought, growers may pay more or less per bag.

Table 1. Data used in the partial budgeting analysis.

Data	Definition	Source
Fertilizer cost	$65/ 50 lb bag	Price paid for a tractor-trailer load (40,000 lb) based on information provided by a Tennessee nursery.
Pro-35	$154.50/dispenser, excluding shipping cost	https://fertileeze.com/ (accessed November 20, 2025).
Labor cost FY 2025 TN Adverse effect wage rate	$15.87/hour	U.S. Department of Labor, Employment and Training Administration

7. Partial Budget Analysis

Evaluating the economic feasibility of using the Pro-35 fertilizer dispenser in #2 and #3 container plant production entails evaluating potential economic benefits and costs associated with transitioning from the manual method of spoon and bucket to this fertilizer dispenser. In this publication, we used a partial budget to assess the changes in costs associated with this transition. A partial budget is a decision-making framework that allows a manager or operator to calculate the expected changes in profits from a proposed change in the operation (Kay, Edwards and Duffy, 2020), in this case, transitioning from the manual method of spoon and bucket to Pro-35 dispensers to apply fertilizer. Adopting this fertilizer dispenser represents a small change as it only entails purchasing the dispenser and training workers in the correct use and calibration of the dispenser.

The partial budget focuses on changes in revenue and costs from the adoption of the Pro-35 dispenser. The partial budget evaluates four components that could change in the #2 and #3 container production budget when adopting this dispenser (see Figure 2):

- Additional revenue
- Reduced expenses
- Reduced revenue
- Additional expenses

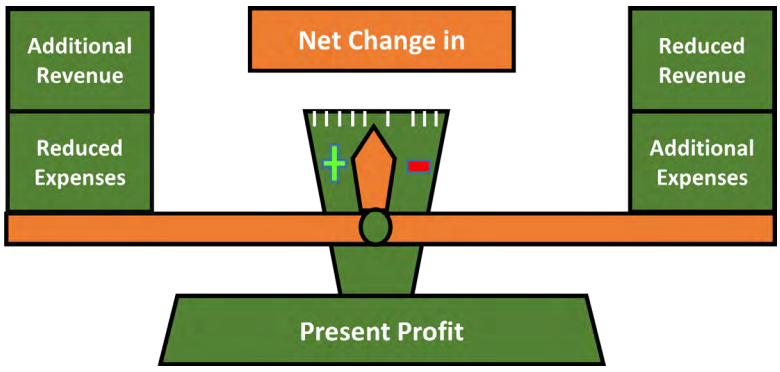

Figure 2. *Illustration for the partial budgeting approach [image credit: Velandia et al., 2019].*

In this publication, we assume no changes in revenue due to the adoption of the Pro-35 dispenser. Revenue could be affected when transitioning from the manual method of spoon and bucket to the fertilizer dispenser if there are changes in the quality of crops, the percentage of culls and/or prices. The trials conducted with Easy Tree Nursery were not designed to test season-long effects on crop growth or health; however, there was no indication that changes in crop quality or price premiums would occur when adopting the Pro-35 fertilizer dispenser.

Given the assumption described above, we only evaluated the impact of the Pro-35 dispenser adoption on costs. The Pro-35 is more expensive than the bucket and spoon equipment. Spoons are made from taping kitchen measuring spoons or free fertilizer measuring spoons from fertilizer manufacturers to a piece of bamboo. Additionally, when adopting the Pro-35, there are generally labor savings related to increased speed or reduced time to apply fertilizer (Harrell et al., 2025). Finally, the use of the Pro-35 fertilizer dispenser could result in fertilizer savings, as there could be an increase in application accuracy, for example, less spillage, when applying the fertilizer with a dispenser.

There might be other benefits related to the workers' level of comfort applying fertilizer, since with the fertilizer dispenser, they do not have to bend over to apply fertilizer. We did not quantify these benefits. Although these benefits are difficult to quantify, they could lead to positive worker retention outcomes. Additionally, labor savings on fertilizer application could result in labor reallocation, specifically moving workers from fertilizer application roles to other activities that are more closely related to revenue generation tasks (e.g., loading plants to fill orders).

8. Assumptions for the Partial Budget Analysis

The assumptions presented below are based on trials conducted at Easy Tree Nursery and are based on plants grown in this nursery and the ability of the workers involved in the trials. The assumptions made for this partial budget analysis include:

A caution on interpreting these results:

The Pro-35 does not inherently reduce the amount of fertilizer applied; it is possible to overapply fertilizer if the appropriate setting is not selected. However, the Pro-35 settings could help achieve the intended application rate because of the small 5-gram increments setting.

1. We assume the unit of production is 10,000 plants or containers per year;
2. We will present a partial budget analysis for two scenarios: 1) #2 containers, Anna's Magic Ball® and 2) #3 containers, Virginia sweetspire 'Merlot';
3. Cost of the Pro-35 is estimated $154.50 per dispenser; we assumed two fertilizer dispensers to be used by two workers will be purchased to cover 10,000 plants per year;
4. The hourly wage rate for manual labor is $17.87 (AEWR + 12.6%);
5. Average labor hours required to apply fertilizer to 10,000 plants per year with the manual method of spoon and bucket is 6.2 hours vs. 2.7 hours with the Pro-35 for Anna's Magic Ball®;
6. Average labor hours required to apply fertilizer to 10,000 plants per year with the manual method of spoon and bucket is 7.1 hours vs. 4.2 hours with the Pro-35 for Virginia sweetspire 'Merlot';
7. Fertilizer cost is $65 per 50 lb bag; this is a typical cost for a grower buying fertilizer in bulk, based on current market prices, that could be applied to Anna's Magic Ball® and Virginia sweetspire 'Merlot';
8. Average lbs of fertilizer applied to 10,000 plants per year with the manual method of spoon and bucket is 347.8 vs. 343.8 lbs with the Pro-35 for Anna's Magic Ball®;
9. Average lbs of fertilizer applied to 10,000 plants per year with the manual method of spoon and bucket is 766.5 vs. 637.6 lbs with the Pro-35 for Virginia sweetspire 'Merlot'.

9. Potential Savings/Additional Cost Associated with Transitioning from the Manual Method of Spoon and Bucket to A Pro-35 Dispenser

Based on the assumptions presented above, we estimated net changes in profit when transitioning from the manual method of spoon and bucket to the Pro-35 for the #2 and #3 containers. Similar to previous studies (Harrell et al. 2025), the Pro-35 minimized fertilizer overapplication, as shown in Tables 2 and 3. Although both scenarios show reduced expenses when transitioning from a manual scoop to the Pro-35, the fertilizer savings are substantially higher for the #3 container scenario ($168) when compared to the #2 container scenario ($5). In both scenarios, savings are relatively modest, considering our unit of production is 10,000 plants. Readers should be cautious when interpreting these results because they are a function of the spoon size and the Pro-35 setting selected for this study. The reduction in the overapplication of, and likewise, the potential to overapply, fertilizer would depend on the Pro-35 setting that is selected and the spoon size it is replacing.

In the number #2 container scenario, the savings do not offset the additional cost of the Pro-35 dispensers in the year they are purchased and put into use (Table 2). If all assumptions are held constant and assuming reduced expenses are constant over time, it would take over four years to pay back the investment in two Pro-35 dispensers ($67.67 x 4.57 years = $309.25). For this scenario, growers will be able to cover the costs of two Pro-35 fertilizer dispensers in the first year when topdressing 45,663 plants (i.e., breakeven number of plants) with two dispensers.

Table 2. Net changes in profit associated with the adoption of the Pro-35 fertilizer dispenser in #2 containers, Anna's Magic Ball, per 10,000 plants.

Additional Expenses (AE)	**=**	**$309.00**	**Additional Revenue (AR)**	**=**	$0.00
Pro-35 (@$154.5 x 2)	=	$309.00	No changes in prices and yield		
Reduced Revenue (RR)	**=**	**$0.00**	**Reduced Expenses (RE)**	**=**	**$67.67**
No changes in prices and yield			Labor savings	=	$62.51
			Fertilizer savings	=	$5.16
A. Total AE and RR	**=**	**$309.00**	**B. Total AR and RE**	**=**	**$67.67**
Net Change in Profit (B-A) = -$241.33					

Similar to the #2 container, in the #3 container scenario, the reduced expenses do not offset the additional cost of two Pro-35 dispensers in the first year (Table 3). If assumptions are held constant and we assume reduced expenses do not change over time, it would take over one year (i.e., 1.4 years) to pay back the investment in two Pro-35 dispensers ($219.10 x 1.41 years = $308.93). For this scenario, growers will be able to cover the costs of two Pro-35 dispensers in the first year when topdressing 14,104 plants (i.e., breakeven number of plants) with two dispensers.

Table 3. Net Changes in profit associated with the adoption of the Pro-35 fertilizer dispenser in #3 containers, Merlot, per 10,000 plants.

Additional Expenses (AE)	**=**	**$309.00**	**Additional Revenue (AR)**	**=**	$0.00
Pro-35 (@$154.5 x 2)	=	$309.00	No changes in prices and yield		
Reduced Revenue (RR)	**=**	**$0.00**	**Reduced Expenses (RE)**	**=**	**$219.10**
No changes in prices and yield			Labor savings	=	$51.55
			Fertilizer savings	=	$167.55
A. Total AE and RR	**=**	**$309.00**	**B. Total AR and RE**	**=**	**$219.10**
Net Change in Profit (B-A) = -$89.90					

Labor savings are consistent across both scenarios and consistent with Harrell et al. (2025), while fertilizer savings are not. Labor savings have an important role in the decision to adopt the Pro-35 fertilizer dispenser. Ingram et al. (2016) estimated labor associated with fertilizer application at 16 percent of total labor cost to produce a #3 container for an East Coast nursery that top-applied fertilizer at planting and the following growing season. Variation in fertilizer savings presented in both scenarios suggests an opportunity for growers to explore the potential of fertilizer savings by optimizing the Pro-35 settings.

10. Sensitivity Analysis

We evaluated the variation in net profit changes when transitioning from the manual method of spoon and bucket to the Pro-35 fertilizer dispenser for the #2 and #3 container scenarios, varying fertilizer cost and the number of plants covered with the two Pro-35 dispensers, while holding labor cost constant (see Tables 4 and 5). We assumed that two fertilizer dispensers would be enough to cover up to 50,000 plants in one year. Based on the results presented in Tables 4 and 5, it seems that scale has the biggest impact on net changes in profits. Both scenarios suggest that if fertilizer prices do not increase by more than 15 percent per year, scale is what would determine the ability to experience positive changes in net profits when transitioning from the manual method of spoon and bucket to the Pro-35 fertilizer dispenser.

Table 4. Sensitivity analysis: Net changes in profit associated with the adoption of the Pro-35 fertilizer dispenser in #2 containers.

Net Changes in Profits #2 containers	Fertilizer cost ($/lb)		
No. of plants	$1.10	$1.30	$1.50
10,000	($242.12)	($241.33)	($240.54)
30,000	($108.37)	($105.99)	($103.61)
50,000	$25.38	$29.35	$33.32

*The $1.30/ lb scenario is equivalent to our baseline scenario of $65/50 lb bag

Table 5. Sensitivity analysis: Net changes in profit associated with the adoption of the Pro-35 fertilizer dispenser in #3 containers.

Net Changes in Profits #3 containers	Fertilizer cost ($/lb)		
No. of plants	$1.10	$1.30	$1.50
10,000	($115.68)	($89.90)	(64.13)
30,000	$270.96	$348.29	$425.62
50,000	$657.60	$786.48	$915.37

*The $1.30/ lb scenario is equivalent to our baseline scenario of $65/50 lb bag

11. Other Factors to Consider

Nursery workers with no prior experience using the Pro-35 fertilizer dispenser quickly learned how to use it and were observed using it during a follow-up visit one month after the initial experiment. The Pro-35 performed well in our tests, but we did not test its performance over time, maintenance needs or expected lifespan. Additionally, we did not investigate how to optimize the use of these dispensers to maximize fertilizer application efficiency. For example, we did not determine the optimal ratio of workers applying fertilizer with the Pro-35s to worker(s) transporting fertilizer to refill the hopper, nor did we develop a hopper filling station. Due to its small volume, efficiently refilling the hopper appears to be critical to fully optimizing the use of the Pro-35 in commercial nurseries. Nursery producers are encouraged to refer to UT Extension publication W1368: Dispensing with Fertilization Labor: An Inexpensive Labor-Saving Fertilizer Applicator for results associated with other comparisons between the spoon and bucket method and the Pro-35 and worker perspectives on application accuracy, dexterity while making applications, and the change in mobility and comfort levels from applying fertilizer with the Pro-35 compared to the traditional bucket and spoon method.

12. Discussion

Growers who are considering the Pro-35 may want to evaluate the main objective they are aiming to accomplish with the adoption of this fertilizer dispenser. On one hand, if they are aiming to reduce labor associated with fertilizer application, they should assess the optimal allocation of workers who have fertilizer application responsibilities, who will be able to perform other tasks because they can complete fertilization tasks in a shorter period of time after the Pro-35 fertilizer dispenser is adopted. Specifically, they could determine how the recouped labor hours allocated to fertilizer application could be reallocated to increase gross margin generated per labor hour. They should also consider evaluating changes in worker wellness and satisfaction after this method has been adopted. This assessment could help indirectly measure the potential impacts of the Pro-35 fertilizer dispenser on worker retention.

On the other hand, if their primary goal is to reduce fertilizer costs or improve fertilizer application accuracy, they should evaluate the impact of the Pro-35 settings on fertilizer application quantities compared to the manual spoon and bucket method. Regardless of their primary goal when adopting the Pro-35 fertilizer dispenser, the scale or number of plants where the dispenser will be used is a factor to consider, especially if the grower aims to pay for the dispensers within a specific period of time.

13. Acknowledgements

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