Case Study

Nursery | Pest and Disease Resistance

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This case study examines the reduction in pest and disease pressure at a Texas containerized plant nursery after a single season using sap analysis and AEA's nutritional protocol.

Key Achievements:

- **84% reduction** in input costs
- **Complete elimination** of fungicides and insecticides.
- **Reduction** in scrapped plants
- **Negligible** pest and disease issues in 3 problem species
  - **Eliminated** *Entomosporium* leaf spot on *Photinia fraseri*
  - **Near elimination** of *Cercospora* leaf spot on *Ligustrum japonica* 'Waxleaf'.
  - **Zero re-infestation** of whitefly on *Viburnum odoratissimum* after an initial attack

Background

Magnolia Gardens Nursery grows ornamental shrubs, trees, perennials, and grasses on 165 acres in Waller, Texas (outside of Houston). They sell containerized plants throughout Texas, to landscapers, garden centers, and re-wholesalers.

Like most nurseries, Magnolia Gardens had relied on pesticides to control insects and diseases, with limited efficacy. At the end of 2024, Magnolia Gardens hired a new General Manager, Michael Roe, who had 7 years of experience successfully using nutrition management with AEA programs to control pests and boost profitability at another nursery. The team at Magnolia Gardens was very receptive to trialing the specific foliar nutritional inputs (determined through sap analysis), to see if it could improve the health and success of their plants.

Challenges

Like many nurseries, Magnolia Gardens has suffered from pest and disease pressure on their containerized plants, and used frequent pesticide applications with limited efficacy. "No matter how many times you spray insecticides or fungicides, you still get insects and disease," said Michael Roe. “Eventually the wheels fall off.”

Nurseries have no margin for error in disease control: infected plants must be culled and scrapped, and certain diseases, like *Entomosporium*, can infect 100% of plants once they appear in the nursery.

Three species were considered “problem crops,” notorious for their disease and pest susceptibility:

Plant species	**Pest / Disease**
Japanese privet (*Ligustrum japonica* ‘Waxleaf’)	*Cercospora* leaf spot
Red tip photinia (*Photinia fraseri*)	*Entomosporium* leaf spot
Sweet viburnum (*Viburnum odoratissimum*)	Whitefly (*Aleyrodidae*)

These three species were the first to get full AEA nutritional treatment and are the subject of this case study.

Solution

At Magnolia Gardens, the IPM team led by Carlos Estrada introduced a program they knew would work based on past experience, modified based on regular sap readings, and knowledge that the nursery was chronically deficient in Calcium and Iron.

The program included:

- **Regenerative Soil Primer** with added Calcium
  - Rejuvenate™, SeaGuard™, CalGuard™, & Spectrum DS™[1]
  - Soil Primer is applied on Sundays, to minimize the number of staff and customers subjected to the delightful odors of liquid fish

- **Monthly Nutritional Foliars**
  - SeaStim™, CalGuard™, and MicroPak™ were key ingredients
  - Applied via overhead fertigation

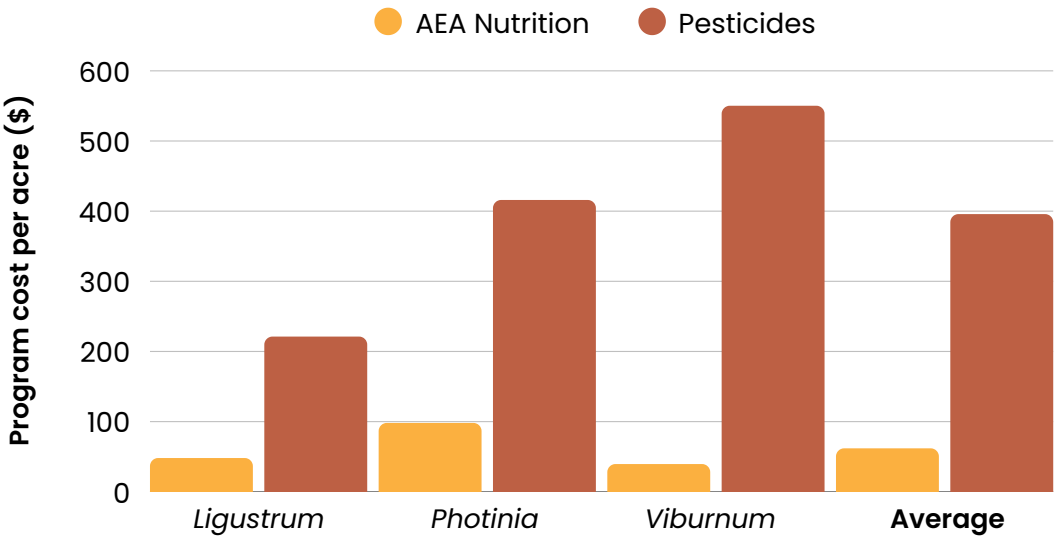
[1] Spectrum DS was chosen to help mitigate potential salt accumulation from the salt-based fertilizers used in containers.

Ligustrum japonica 'Waxleaf'. Residual Cercospora leaf spot on the lower leaves was completely controlled: the new growth flushed out clean.

Results

Over the course of 5 months, all three species showed a massive increase in sap nutrient levels across the board. At the same time, the pest and disease problems were controlled or completely eliminated, showing that plant nutrition management can create plants with high-functioning immune systems.

Program Costs



Remarkably, the AEA nutritional program not only provided better control of pests and diseases, it also cost a whopping 84% less on average than the conventional pesticide program[2] used in years past: $61.91 vs. $395.80 per acre.

Crop	# Foliar Nutritional Sprays	Total Foliar Spray Cost (per acre)	# Chemical Sprays	Total Chemical Spray Cost (per acre)	% reduction
Ligustrum	4	$48.09	5	$221.22	-78%
Photinia	5	$98.12	9	$415.94	-76%
Viburnum	3	$39.51	4	$550.25	-93%
Average:	**4**	**$61.91**	**4**	**$395.80**	**-84%**

[2] The fungicides previously used included Cleary's 3336, Daconil, Orkestra, Pageant, and Torque. Insecticides were Pradia, Rycar, Ventigra, and Xxpire.

Sap Analysis

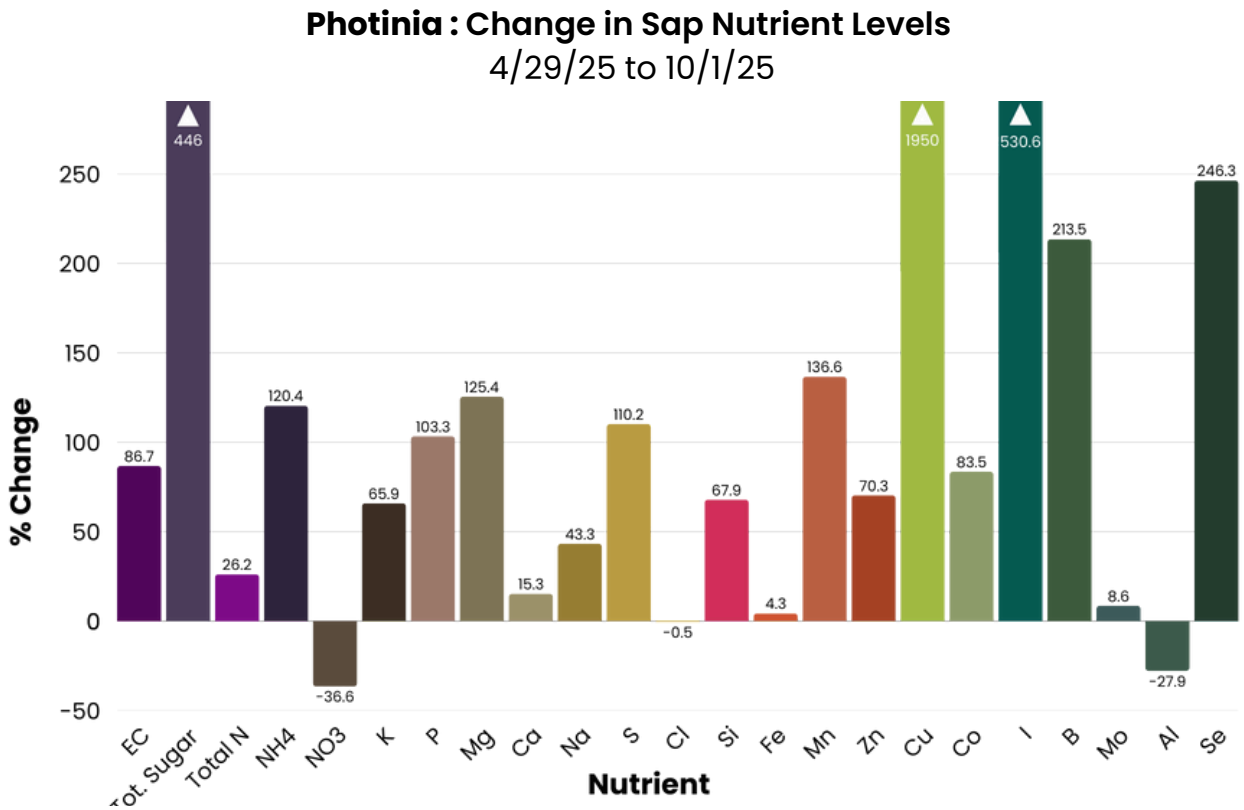
In this section, we'll explore the sap analysis for each of the three plant species, highlighting items of particular interest.

Sap analysis was taken monthly on new and old leaves. When we use sap as a tool for agronomic guidance, the difference between the old and new leaves provides critical nuance to understand how the plant is moving nutrients, and what processes it is prioritizing. To simplify things here, we used the average of new and old leaves and show the percentage change in those averages between 2 readings over the 5-month period from April 29 to October 1.

Photinia fraseri

✅ **Completely eliminated Entomosporium leaf spot**

- 20 of the 22 nutrients measured showed an increase on the second sap analysis, with 10 having doubled or more.
- One of the nutrients that decreased was Nitrate (NO_3): decreasing nitrate tends to be a positive indicator of plant health.
- Aluminum also decreased: a positive indicator since Al levels are often associated with root stress.



Total Sugars

Total sugar levels increased by a whopping 545% from April to October, from an average of 0.6% to 3.275%, indicating that the plants had a greater ability to create sugars through photosynthesis and developed higher energy reserves. Coupled with the lower levels of nitrates, it shows that the *Photinia*'s metabolism was functioning properly.

Electrical Conductivity

EC nearly doubled, from an average of 9.87 mS/cm in April to 18.42 mS/cm in October. EC is a crucial indicator of a plant's nutritional status and overall health.

Key nutrients

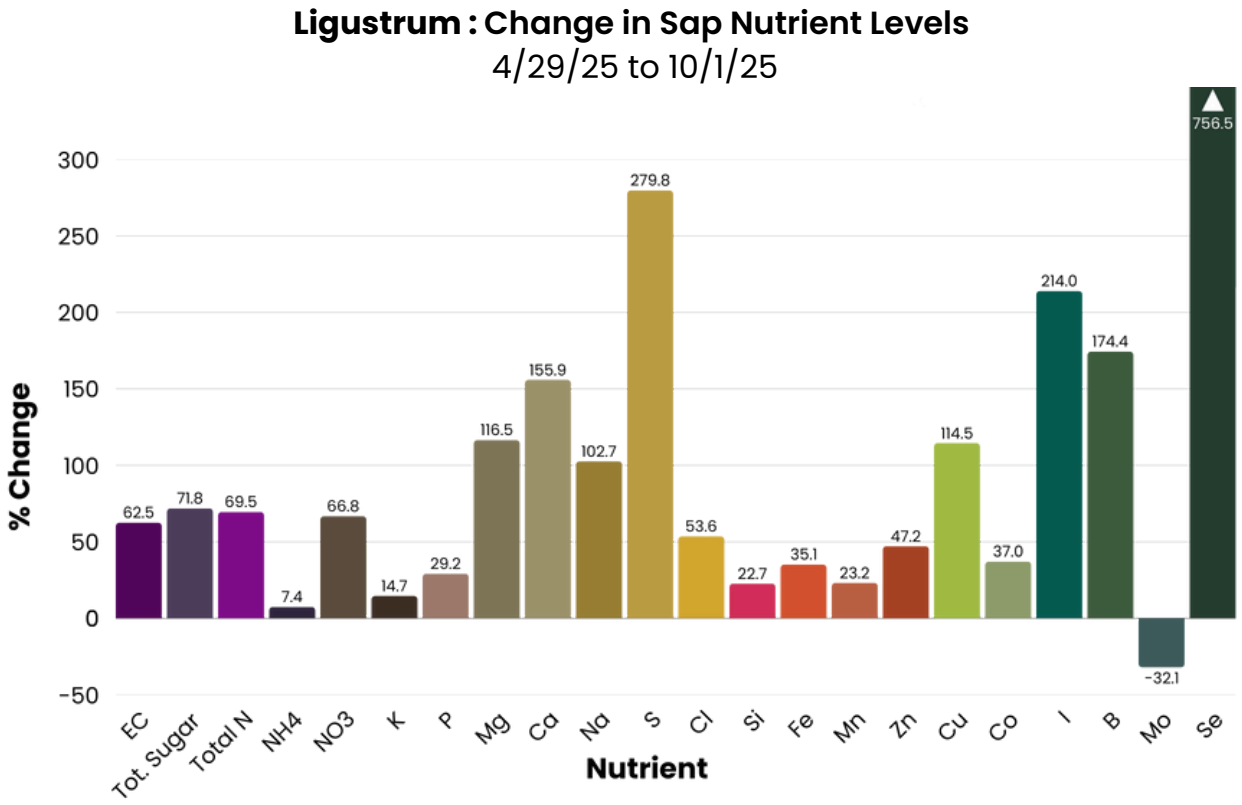
Phosphorus, magnesium, sulfur, manganese, and boron all more than doubled. These nutrients are all essential for photosynthesis and/or protein synthesis, helping the plants create more energy and more complex molecules, which reduces its pest susceptibility.

Left: Untreated Photinia (neither nutrition nor fungicides). Right: AEA-treated Photinia.
Fungicide-treated photinia are not pictured. They looked nearly as good as the AEA-treated, but cost over 4X more.

Ligustrum japonica

✅ Near elimination of *Cercospora* leaf spot; presence limited to old overgrown plants.

- All but one of the 22 measured nutrients increased; 7 more than doubled.



Total Sugars

Though not as dramatic as in *Photinia*, the total sugars still increased substantially: from 4.86% in April to 8.35% by October.

Calcium and Boron

Calcium and Boron work together: boron improves calcium mobility, essentially serving as the "thermostat" for calcium. They are critical for forming cell walls, root development, sugar transport, and disease resistance.

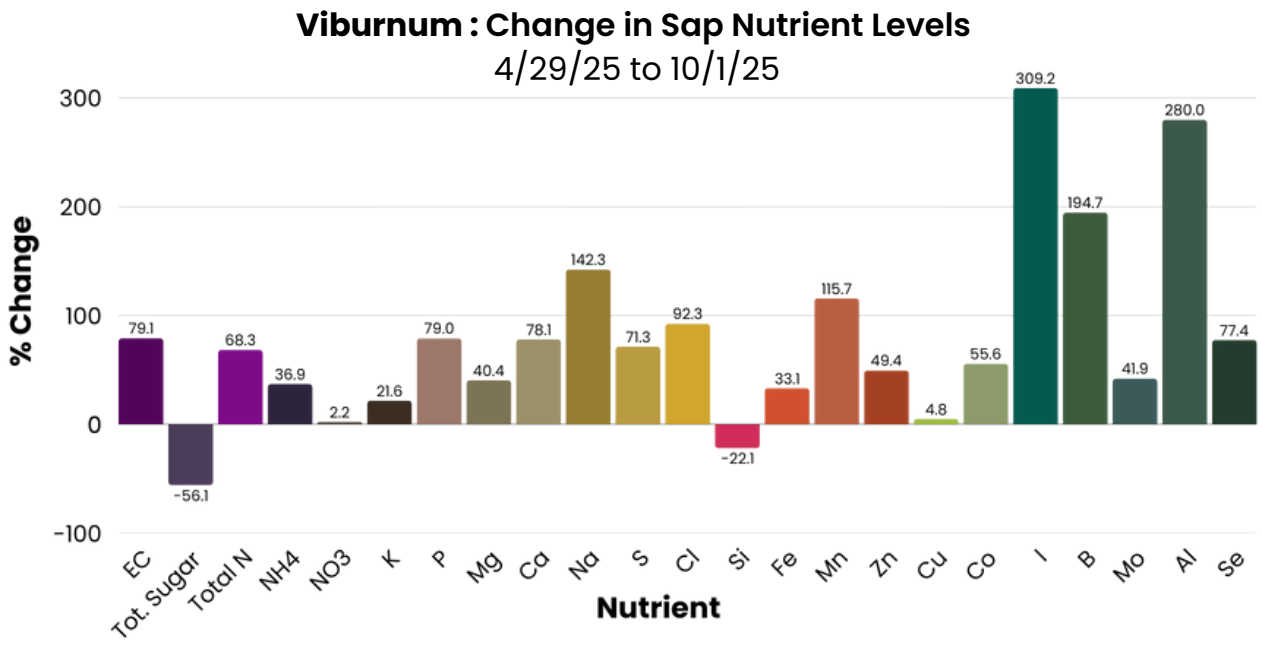
Here, both nutrients improved substantially—Calcium by 156% and Boron by 174%—which was likely a key factor in *Ligustrum*'s ability to resist disease.

Viburnum odoratissimum

✅ Zero re-infestation of whitefly after an initial attack

The *Viburnum* showed visually improved health and resisted whitefly re-infestation. However, its sap data aren't as straightforward and present a few mysteries, which we'll explore below.

Note: the *Viburnum* only received 3 nutritional treatments, while *Ligustrum* got 4 and *Photinia* 5.



Sugar Reduction

For the previous two plants, we noted the increase in sugars as a positive change. Here in the *Viburnum*, total sugars decreased substantially. However, the plants visually appeared healthier, with no major problems. In early November, Michael said "[The *viburnum*] are bulletproof right now. They're beautiful and glossy. They shouldn't even look that good right now, honestly."

So, it's likely there's some hidden story involving the plant's seasonal metabolism. Perhaps the plants were sending sugars down into their roots in preparation for dormancy or using up sugars in building new plant structures.

Aluminum and Iodine

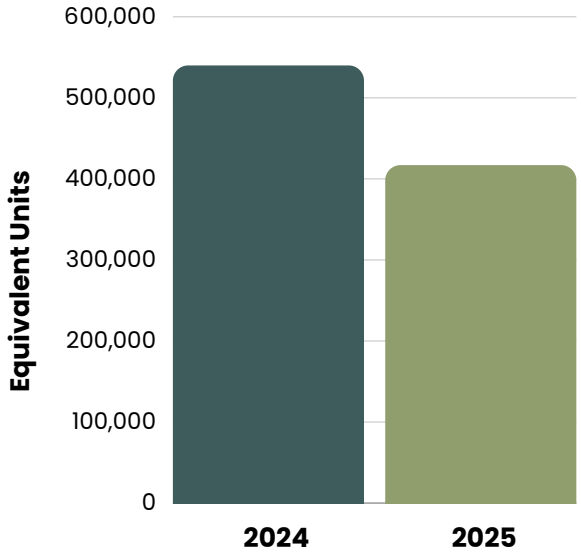
The Aluminum display on this chart is a bit misleading: it increased by 280%, and high aluminum levels actually tend to correlate with whitefly infestations. In this case though, the absolute levels remained low: increasing only from 0.2 ppm to 0.76 ppm, still well within an acceptable range. The same holds true for Iodine, which went from an average of 0.3 to an average of 1.3: still entirely reasonable.

Dump Reduction

Further cost savings came from the reduction in plants dumped due to disease: a **23% reduction** in equivalent units of scrap YTD: from 540,000 EU's in 2024 to 417,000 in 2025.

These numbers are for the entire nursery, while the regenerative practices were fully implemented on only 3 species, so there may be other contributing factors. But scrapped plants definitely decreased in the 3 species studied here, though precise quantification is not possible.

In 2026, regenerative practices will be applied across the whole nursery, so the dump data will be more precise. Stay tuned.



Weed Germination

Michael has noticed a tremendous difference in weed pressure. "I could actually see which areas didn't get Soil Primer, primarily because of the weed pressure, not necessarily the look of the crop."

Michael notes that weed seed germination is determined by the top ¼ inch of the soil profile. He hypothesizes that his Soil Primer and calcium applications sufficiently changed the balance of that ¼ inch to discourage weed germination.

We lack any quantitative data for weed pressure, but it's a compelling result, and something to track in the future.

Viburnum odoratissimum. Black sooty mold is growing on whitefly excrement on the bottom half of the plants, but the top half is perfectly clean: the whiteflies were completely controlled through nutrition management.

What's Next

Michael is eager to expand his program at Magnolia Gardens, and the nursery's management and board are all-in after seeing these successes.

Here's what they have in the pipeline:

Implement AEA protocol on all acres

Having proven the efficacy and value of the full AEA program on these 3 problem species, Magnolia Gardens will use it on all acres in 2026.

Develop sap optimums for nursery plants.

Over the past two decades, AEA has developed nutrient range optimums for most major crop plants, but we do not yet have optimums for less common crops, including nursery plants like the 3 studied here. That limits our management goals to generally "increase nutrients" without knowing an exact target.

AEA's FieldLark AI can generate optimums with as few as 50 sap samples. We will try to reach that number for these crops so we can understand target levels with much greater specificity. This will save money by preventing over-application, as well as prevent agronomic problems caused by excessive nutrients.

Organic Line

Trials using a fully organic program at Magnolia Gardens delivered equivalent results as the conventional program, with a negligible increase in cost. Magnolia Gardens may introduce a certified organic line of plants going forward, which would open up new sales channels and increase profit margins.

Conclusion

What's more surprising than the incredible first-year results at Magnolia Gardens is that so many nurseries are still using ineffective, expensive, and hazardous chemicals to attempt pest and disease control, when they could be using plant nutrition management to achieve better results for less than 1/6 of the cost.

We applaud Magnolia Gardens' trailblazing leadership: they've showed what's possible using precision nutrition management at scale in containerized plants.

An exciting future awaits as more nurseries follow Magnolia Gardens' and adopt progressive management practices.

About Advancing Eco Agriculture

Advancing Eco Agriculture (AEA) helps farmers succeed by empowering them to grow crops that are more productive, resilient and profitable. We provide data-based agronomic consultation and a range of powerful liquid mineral nutrition and biological products.

AEA is dedicated to a whole-systems approach to revitalizing soil and plant health, looking beyond symptoms by diagnosing root causes and providing treatments. This approach, informed by more than 18 years of data and on-farm experience, increases yields and crop performance, reduces or eliminates the need for pesticides and fertilizers, and generates immediate economic returns for farmers.

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