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Curtis and Priscilla Lucero operate a greenhouse in which they do all their starts, mostly berries but also heirloom tomatoes (shown here). Photos: Lucero Organic Farms

Carving a Niche

Lucero Organic Farms grows and sells just one strawberry variety — and it makes it stand out from the competition.

By David Eddy, Editor

Ben Lucero was ahead of his time. He worked the strawberry fields in the 1950s and '60s in Watsonville, CA, an area known for berries. He later learned, after starting to grow his own berries, that he would have to distinguish himself from other growers, says son Curtis, who took over when his dad retired.

“Especially the berry growers over in Watsonville, where they grow big berries the size of your fist — though they can be hollow and white inside and have no flavor,” Curtis says. “So, my dad grew his like you’d

grow them in your own backyard. They’re smaller but much sweeter, more concentrated. He’d pick ‘em with long stems, so everybody

would know the difference between Lucero berries and all the others.”

Back then, before farmers markets blossomed in Northern California, Ben Lucero was wholesaling, selling to the big markets in Oakland and San Francisco. The competition was fierce, and when the San Francisco farmers market was started in 1993, Ben got in that very first year. His son is grateful he got that precious spot, as now the waiting list is long.



The stems are notable on Lucero Organic Farms berries.

It was about that time he was able to start growing the 'Seascape' variety, which was released by the University of California, Davis in 1991. 'Seascape' was perfect for Lucero, as it is highly productive over a long season. The ever-bearing strawberry also has good disease resistance and remains evergreen in frost-free areas, such as Northern California. It also has, as the Luceros require, long stems.

Second Generation

As a teen, Curtis Lucero was unsure farming was for him. He wanted to see the world, and, upon joining the Army, got his wish. Among other highlights, he was in Germany for the fall of the Berlin Wall. Retiring from the Army after 20 years, he worked at a few jobs before his dad lured him back, and Curtis got hooked on farming.

Today Lucero Farms is located in Galt, CA, which is in the Northern San Joaquin Valley, much warmer than Watsonville. He focused on the 'Seascape' variety, which can take the heat, and after all these years, he has it dialed in. Because he was not looking for tremendous size but tremendous flavor, he eliminated the irrigation schedule to intensify the berries' flavor.



Lucero Organic Farms strawberries at farmers markets are known for their extremely long stems.

“We only water as needed,” he says. “We don’t water on a regular basis, maybe every two to three days in this weather (about 60° F). Over there (on the coast), they are on a regular watering schedule to blow them up.”

Organic From The Start

Lucero Organic Farms has been organic since the National Organic Program (NOP) began in 2000. Ben Lucero was already using organic practices almost exclusively, but the NOP required a lot of paperwork to prove it. He balked but soon obliged when he found you could charge more for organic berries.

“Now it seems like conventional growers get close to organic prices,” Curtis Lucero laments. “There used to be a big difference.”

He says organic berries should get a price bump, for a couple of reasons. “One, their berries are huge, so there’s not as many in each container, but it’s mostly the labor (cost),” Lucero says. “Their guys will pick 12 flats an hour; we’re lucky if we pick two an hour. Also, our guys have to find the stem, so it takes longer.”



Priscilla Lucero says people complain that other growers sell three pints for \$11, \$3 less than they charge. She simply suggests they taste Lucero berries.

Farm Market Focus

In 1998 Lucero met his future wife, Priscilla, and they have been together ever since. She now coordinates their farm market sales, which are extensive. They sell their berries, along with some hard-to-get vegetables, such as okra and an extensive line of mostly heirloom tomatoes, at seven markets in the San Francisco Bay Area. They also have their own farm market, which is open a couple of days during the week.

Priscilla Lucero had her own daycare for many years, and she quickly realized the value of Lucero berries and the intensively farmed

vegetables. She would take the kids to the farm, and they would gobble up virtually everything they picked.

“Parents would be like, ‘They don’t eat this at home,’” she recalls. “And I would say, ‘Yeah, that’s because you’re buying storebought stuff.’”

Priscilla is now a board member of the Agricultural Institute of Marin (AIM) — which despite its name now covers all the farmers markets in the San Francisco Bay Area. She has learned a lot in her four years on the board.

“I thought it was simple because, as a farmer, you only see one part of it, there’s so much behind setting up,” she says. “It’s advocacy for policy change. It’s not just about advocating for the farmers, it’s about advocating for the consumers, even the land.”



The Luceros’ granddaughter, Adelaide, likes a big heart-shaped berry.

Farmer is VIP

Over the years, many chefs in the Bay Area have come to prize Lucero berries and other produce. The Luceros now

have large dinners outdoors on the farm, where the chefs from the cities whip up gourmet meals. It has become quite a hit, with many of the Luceros’ regular customers at farmers markets attending.

“There’s a real partnership between restaurants and farms,” Priscilla says. “We go to San Francisco and go to these Michelin restaurants, and they treat us like royalty. They just bring us out all these dishes.”

Curtis recalls one of their restaurant experiences, smiling broadly at the memory.

“There’s a line out the door,” Curtis says, “and we just got rushed in. The owner says, ‘Come on in, Luceros, come on in.’ Everyone’s like, ‘Why are these people getting ahead?’ But that’s how farmers should be treated.” ●



David Eddy is Editor of *American Fruit Grower*.
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These ‘Seascape’ variety strawberries need a little more heat in spring before taking off.

The Solution is in the Science: Strategic Use of In-Season Foliar Nutrition Boosts Blueberry Yield



Blueberry growers who use targeted foliar nutrition strategies during the critical three-to-four-week fruit cell division stage can maximize fruit size and fruit firmness. This stage occurs just after bloom, as the fruit begins to develop, and is one of the most important windows of opportunity for growers to positively impact their crop.

Calcium is a key nutrient for improving fruit cell wall thickness and fruit firmness. While the blueberry bush will take calcium up through the root system, getting this nutrient into the developing fruit is challenging. Foliar calcium sprays during fruit cell division are essential to improve fruit firmness. By increasing berry firmness more fruit can be machine picked for fresh fruit markets while also achieving better fruit shelf-life.

Agro-K's **System®-SeaCal** and **System®-Cal** are "true" foliar calcium phosphite products. They provide systemic, readily available calcium that can rapidly penetrate the leaves and move in to the fruit. Unlike many foliar phosphite products on the market, **System®-SeaCal** and **System®-Cal** contain no potassium as this nutrient can antagonize calcium uptake by the fruit.

System-SeaCal also contains a proprietary seaweed extract that promotes fruit cell division and helps minimize physiological stress. Reducing plant stress during this crucial growth stage contributes to improved overall plant health and productivity.

Phosphorus is central to the plants' ability to store and transfer energy. Fruit cell division is an energy-intensive process that requires adequate phosphate fertilization. Agro-K's **Agrobest® 9-24-3** is a liquid, 100% orthophosphate-based product, well suited for early season foliar applications, with minimal potassium to avoid calcium antagonism.

Post petal fall, blueberry bushes go through a period of rapid leaf development. At this window of opportunity blueberry bushes require magnesium, iron, zinc, and manganese to support leaf development, chlorophyll production, and photosynthesis. Agro-K's **Zinc +5 D.L.®** and **Vigor-LeafMax** provide readily available forms of these nutrients that are designed for foliar applications with rapid nutrient uptake. This helps maximize leaf size, leaf function, and energy potential delivering uniform fruit quality and yield year over year.

Agro-K's comprehensive, science-driven foliar nutrition programs are designed to deliver the **Right** nutrients, at the **Right** times, in the **Right** forms, **Right** mixes, and **Right** places to meet the crop's windows of opportunity. This approach is fundamental to enhancing crop quality, yields, and grower profitability.

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Strategic application of calcium in the critical three- to four-week fruit cell division window just after bloom is one of the most important ways to maximize blueberry size and firmness.

Calcium is essential in cell division and cell wall integrity; if it isn't available in adequate amounts, the result is smaller, lower-quality fruit and reduced shelf life.

Other nutrients are important too. Phosphorus, magnesium, iron, zinc, and manganese support other plant processes necessary for healthy plants and fruit. The key is to apply them in the right form and at the right time to meet the crop's peak nutritional demands.

Agro-K's comprehensive, science-driven foliar nutrition programs are designed to deliver the **Right** nutrients, at the **Right** times, in the **Right** forms, **Right** mixes, and **Right** places to meet the crop's windows of opportunity.

This approach is fundamental to enhancing crop quality, yields, and grower profitability.

The key is to apply the nutrients in the right form and at the right time.



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Buzzworthy Insights

Maximizing blueberry pollination through colony placement.

By Lisa Wasko Devetter

Author's Note: Special thanks to coauthors Meghan Milbrath and Rufus Isaacs of Michigan State University and Suzette Galinato of Washington State University.

Where blueberry growers ask their beekeepers to place honey bee hives may seem like a trivial matter. However, many growers and beekeepers would beg to differ.

Historically, many growers have asked beekeepers to distribute hives throughout the fields, placing pallets in many small drops distributed near bushes to maximize pollination and yield potential. However, this increases beekeepers' time to deploy and manage hives, requires more fuel, and puts the beekeepers at risk of getting stuck in fields that are often muddy.

Beekeepers are also limited on time during pollination, as hives must be moved at night, sometimes leaving beekeepers with only a few days to deploy hives. If beekeepers are asked to spend extra time and money placing hives, then it at least should result in increased yields for growers. Yet research guiding these practices has been scarce until now.

Placement and Pollination

Many beekeepers have been advocating for larger drops of hives to save labor, fuel, and

time. But does this more efficient placement strategy reduce crop pollination? To address this question, collaborating scientists in Michigan, Oregon, and Washington explored whether hive placement affects crop pollination.

A total of 32 and 34 fields were monitored in 2021 and 2022,

respectively, across all three states. Approximately half of the fields were assigned a "dispersed" treatment, where pallets of hives were spread out adjacent to the field edge (Fig. 1). The remaining fields were assigned a "clumped" treatment, where pallets were clustered away from the field edge.

Results showed fields with the clumped treatment had significantly higher honey bee visitation to blueberry flowers compared to the dispersed treatment under optimal weather conditions (e.g., air temperatures >55°F, sunny to partly sunny). However, when the weather was suboptimal, honey bee visitation was unaffected. Yield components and indicators of pollination success were interestingly not impacted by the placement treatments. This is likely due to the flowers being sufficiently pollinated despite differences in honey bee visitation.

Another dimension of hive placement is related to bee health. Beekeepers have observed declines in hive health following blueberry pollination. The reason(s) for these



A honey bee pollinates blueberry flowers.

Photo: JoannaKaczuk - stock.adobe.com



Figure 1. Clumped treatment (top) and dispersed (bottom) honey bee hive placement treatments.

Photos: Lisa DeVetter

declines are not fully understood, but pesticide exposure has been identified as one potential contributing factor.

Growers frequently apply fungicides during bloom to protect their crop from fungal infections. Other pesticides may be applied too, such as insecticides for management of pests like aphids. While growers are taking action to minimize risks to their bushes during bloom, beekeepers are also concerned about minimizing risk to their hives by limiting pesticide exposure.

Pesticides were sampled during bloom at the same sites with hives in “dispersed” or “clumped” configurations by using silicone bands placed on hive exteriors. These bands measured drift onto the colonies from nearby spraying activities. The data from 2021 were highly variable, attributed to differences in spray programs; sprayer technology; what’s occurring in adjacent, non-blueberry fields; and weather. However, there was a trend of lower pesticide residues in the clumped hives for most sites.

The distance a hive is placed from the field edge likely impacts pesticide drift onto that hive, and this was explored further in 2023 using silicone bands. Results showed pesticide residues adjacent to the field edge are the same as those detected inside the field on the bushes, with residue levels declining significantly for hives placed more than 80 feet from the field edge. Further work is needed to characterize optimal distances for drift reduction.

Putting it Together

What does this all mean and how can it be used to help growers and beekeepers? Our first takeaway is that clumping hives increases honey bee visitation to flowers and does not reduce crop pollination. In

fact, there is potential for improved pollination for cultivars that are more challenging to pollinate. Clumping also can improve beekeeper efficiency during hive deployment, removal, and maintenance.

Interpreting the pesticide data is ongoing, but it seems that drift onto hives is reduced by placing them further from the field edge. This is context specific and depends on several factors. Research is ongoing to better understand these factors and create strategies for blueberry growers and beekeepers to work together to maximize blueberry pollination and their respective revenue stream.



Photo: Serhii - stock.adobe.com



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Visit BlueberryPollination.org/ to learn more about the Blueberry Pollination project. ●



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Parasitoids Trail SWD from Coast to Coast

“Devastating” spotted wing drosophila draws crowds of beneficial wasps.

By Thomas Skernivitz

As incidence of spotted wing drosophila (SWD) intensifies across the U.S., so too does the battle against the invasive berry-eating fly, particularly on the biological control front.

USDA ARS Research Entomologist Xingeng Wang, speaking on behalf of the Sustainable SWD Management SCRI Project, broke down the latest results of 2022 and '23 nationwide releases of *Ganaspis brasiliensis* (G1 lineage), a parasitoid wasp that preys on the larvae of SWD. *Ganaspis* parasitoids are approved by USDA Animal and Plant Health Inspection Service (APHIS) to be reared and distributed around the U.S. as a biocontrol.

Comprised of 14 universities, three USDA labs, and two state departments of agriculture, the SCRI project involved insectaries in 12 states in 2022 and 15 last year. Permit requests involving another 15 states are under consideration, according to project co-presenter Kent Daane, a Cooperative Extension Entomologist with the University of California, Berkeley.

Preceding the first two *G. brasiliensis* (G1) releases — 51,515 in 2022 and 110,289 in 2023 — another parasitoid wasp, *Leptopilina japonica*, was accidentally introduced in British Columbia, Daane says. That beneficial insect has since spread to not only nearby Washington state and Oregon but also other reaches in North America, he adds.



Photo: i-am-helen- stock.adobe.com

Regional Results

Wang and his staff, based in Delaware as part of the Beneficial Insects Introduction Research Unit, maintained a parental colony of *G. brasiliensis* (G1) while redistributing to 17 labs across the U.S. for rearing and release. They produced the wasps for release in Delaware, Maryland, and Pennsylvania.

In 2022 both *L. japonica* and *G. brasiliensis* (G1) were recovered from each of three release sites in Delaware and at some sites in Pennsylvania

and Maryland. Last season *G. brasiliensis* (G1) was recovered even before the 2023 release had occurred, indicating the wasp had established itself after the 2022 releases.

“In Delaware we are focused on the establishment. We wanted the wasps to establish first,” Wang says.

Meanwhile, fruit sampling — involving various berry host plants as well as pokeweed, autumn olive, and honeysuckle — revealed the seasonal dynamics of SWD density and parasitism by the two wasps.

“Mulberry is one of the first fruit to mature in June, and then with seasonal progress we have wineberry, raspberry, blackberry, and later on, in middle of the fruit season, we have honeysuckle. Even in late October we still have honeysuckle in the field,” Wang says.

Overall, the patterns in 2022 and '23 ended similarly. For instance, when SWD appeared in early July, the wasps appeared as well. When SWD reached its peak in early August, so did the wasps. When the fly population crashed later in August, the parasitism also declined.

“The parasitism range in our areas was as high as 80%,” Wang says. “The *Rubus* are the main host plants in the early season, and in the later season the honeysuckle and autumn olive are the main hosts.”

In other states — Wang singles out Michigan, Maine, Georgia, North Carolina, New Jersey, New York, and California — similar releases resulted in similar successes, he says.

Moving Forward

Wang asks researchers to:

- **Continue the release and monitoring of *G. brasiliensis* (G1) and *L. japonica* to better understand climatic adaptability, host plants, and interspecific interaction.**
- **Continue Asian collections of fresh G1 specimens to maintain vigor of the parental G1 colony.**
- **Explore key ecological traits among Asian populations to optimize selection of strains that can adapt to different climate zones in the U.S.**
- **Promote the impact of parasitoids and other natural enemies by using reduced-risk insecticides.**



Spotted Wing Drosophila (SWD) Photo: Tomasz - stock.adobe.com

“SWD is one of the most devastating and persistent pests we have ever seen in small fruits,”
University of Georgia Integrated Pest Management Entomologist

Ash Sial says. “An integrated approach, consisting of a combination of chemical, biological, behavioral, and cultural tactics, is needed to control such a pest. Once established, exotic natural enemies will contribute to lowering the SWD populations in the long term.” ●



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Breeding Advances Propel Berries

These molecular methods are moving the industry forward in genomic selection.

By John R. Clark

As many as you are aware, my career of 40-plus years in berry breeding focused on a traditional breeding approach since molecular methods were not well developed to aid in berry breeding programs.

Several years ago I wrote a column about molecular applications in strawberry, focusing on the University of Florida (UF) breeding program led by Dr. Vance Whitaker, who had implemented a wide-ranging molecular component to his program, including marker-assisted screening of seedlings as well as genomic selection (the column can be found at is.gd/berry_breeding).

Here we are several years later, and I want to revisit the topic of molecular applications in berry breeding. A member of Whitaker's team at UF was Dr. Sujeet Verma. I had met Verma many years ago when he was a graduate student at Washington State University, and we were both involved with the RosBREED project that targeted molecular applications across a range of rosaceous crops.

Verma has recently joined Fall Creek Nursery as Genomics Research and Molecular Diagnostics Manager working with Director of Breeding Dr. Paul Sandefur. Fall Creek operates one of the major blueberry breeding programs



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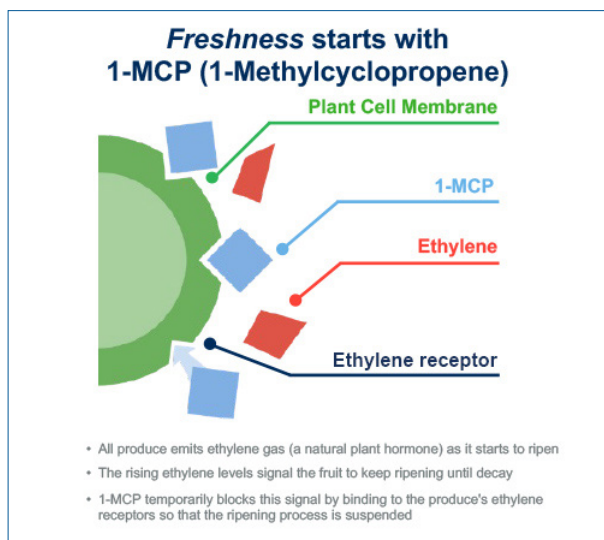
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To gain confidence in your next blueberry harvest and every harvest after that, blueberry growers should consider adopting the innovative, pre-harvest technology of Harvista 1.3 SC.

*References available upon request.

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in the world. I asked Verma to share insights on several areas of molecular applications from his experiences.

JRC: What are the more common current molecular applications in berry breeding these days in active variety development programs?

Verma: “There are not a lot of promising molecular techniques being applied to berry crops other than strawberry, reasons being that strawberry is more economically important, has a shorter life cycle, and its breeding behavior generally is simpler due to its more common diploid inheritance pattern (other berry crops often have more complex trait inheritance).

“Blueberry is a little behind in applying molecular methods due to its longer life cycle plus unsystematic polyploid genetic activity. At Fall Creek we have developed in-house DNA fingerprinting methods for true-to-type determination, which is extremely valuable in being sure that all varieties are what they are supposed to be in propagation and marketing.

“There is a lot of research going on in blueberry to determine traits that are controlled by one or two genes vs. multiple genes. Many traits in berry crops are controlled by multiple genes, and I think genomic selection could be the best way to move forward. Fall Creek is also equipped with high throughput phenotyping machines, which can be a game changer for rapid application of a genomic selection approach.”

JRC: How are these applications speeding up or helping breeding?

Verma: “These molecular techniques are helping breeders get ahead of the game. Breeders can now predict the performance of seedlings without growing the plant to maturity. Breeders can make as many crosses as they want and let molecular markers pick the desired seedling for them. Identity checking, parentage checking, inbreeding, and breeding value are some of

the other helpful genetic parameter estimates helping to speed up berry breeding.”

JRC: What are the biggest limitations in using molecular methods in berry breeding compared to more major crops like row crops and vegetables?

Verma: “Genome complexity, polygenic inheritance, heterozygosity, and length of generation/fruitletting cycle are the major limitations in using molecular markers in berry crops compared to row crops. Limited genetic resources and knowledge are other major limitations. The good news at Fall Creek is that we are investing in developing in-house genomic resources for DNA informed breeding in collaboration with external partners.”

JRC: What does the horizon hold for berry breeding and expanding molecular methods?

Verma: “I think the future of berry breeding using molecular methods is very promising! I recall a similar situation 10 years ago with strawberry, and now it is leading the way in the application of molecular technology among all berry crops. At the moment, proof of concept for many molecular methods is being established for other berry crops, and it is just a matter of time before methods like marker-assisted seedling selection and genomic selection are routinely applied in berry breeding at Fall Creek.”

Breeding of fruit varieties has always been one of the slowest activities in plant breeding, for many of the reasons highlighted above. Molecular applications have lagged in a similar way. It is exciting to see the new technologies being implemented in both public and private sector breeding, with these techniques being moved forward by Verma and other innovators.

Let the berry good times roll! ●



John Reuben Clark is a distinguished professor emeritus of horticulture who worked his entire career at the University of Arkansas. He is now an international consultant in fruit breeding. Our berries columnist has worked in fruit breeding for more than 40 years, and has developed or co-developed 80-plus varieties with a primary emphasis on small fruits. jrclark@uark.edu



Early Season Nutrient Management for Blueberries

Advancing Eco Agriculture (AEA) uses soil and foliar applications informed by plant sap analysis to grow healthy, quality blueberries in challenging conditions like high-sodium and high-pH soils.

Critical points occur in the growth cycles of blueberries when growers can positively affect future fruit quality with mineral and biological applications, informed by precision plant nutrient monitoring. In this way, AEA best assists growers in supporting bushes as they pass through all developmental stages leading to harvest.

As buds swell early in the season and xylem begins to flow, it is advantageous to provide a nutrient boost, especially if bushes have withstood deep freezes that limit stored sugars, have undergone hard winter pruning, or have had exposure to stressors as with new plantings. AEA recommends an application containing a mix of soluble carbohydrates, trace elements, and soil microbes called the **Regenerative Soil Primer**, which is applied by banding onto the soil or via drip into rows or substrate.

Bud break presents the first opportunity of the season to push appropriate micro- and macronutrient foliar treatments that set up plants for a strong bloom event. A successful crop depends on the delivery of adequate nutritional support to blueberries – and all fruiting plants – during the stressful transition between vegetative and reproductive functions. Targeted micronutrient foliars can improve nitrogen processing and protein synthesis to bolster plant immunity to pests and diseases. AEA recommends using ocean products to provide trace mineral support to impart resistance to insects and pathogens during the vulnerable blossoming period.

In the later stages of bloom, it becomes necessary to promptly switch to managing the critical fruit cell division stage. AEA uses valuable data from leaf sap testing during this time to guide foliar-applied nutrition intended to affect the size and firmness of berries at the earliest opportunity. Potential firmness and shelf life are determined by supplying targeted nutrition to meet the resource-intensive need to form strong cell walls by increasing the number of cells formed at this time. Cell division is the optimal time to move nutrients, especially calcium, into the developing cells and the same chance does not recur later in the season.

At the onset of the fruit fill stage, there are dual objectives: grow berries to maturity and ensure the growth of shoots adequate to host next year's buds, leaves, and berries. It is vital to monitor and guide nitrogen during this period to ensure appropriate shoot growth for crop success in the next season. Again, pulling sap samples is crucial to guide foliar applications. Some berry rows can become dense and closed up as the berries weigh down branches, limiting the operator's ability to make foliar applications. Frontloading heavier foliars – even as frequently as weekly – before this can provide a solution for those periods when rows cannot be accessed with a sprayer. Increasing biological fertigrations at this stage can hold fungal issues at bay, especially in regions with higher humidity. Maintaining a robust biological soil profile will help to maximize nutrient uptake, whether bushes are in soil or substrate.

The last word: Don't guess when you can test! Not only does AEA use recurrent sap analysis during the blueberry growing season to balance nutrients and promote resilience to insects and diseases, but also improves metabolic processes within the plant. Analyzing sap does what soil testing cannot – it measures what nutrients are in play inside the plant in near-real time; soil testing only indicates what is present at the root and not what is ultimately available to the plant.

AEA's Farm Services team helps growers hone their nitrogen and bulk amendment plans as a part of helping producers assess their entire fertility program. Our goal is to help growers grow their best crop by keeping fertilizer use lean and efficient. ■



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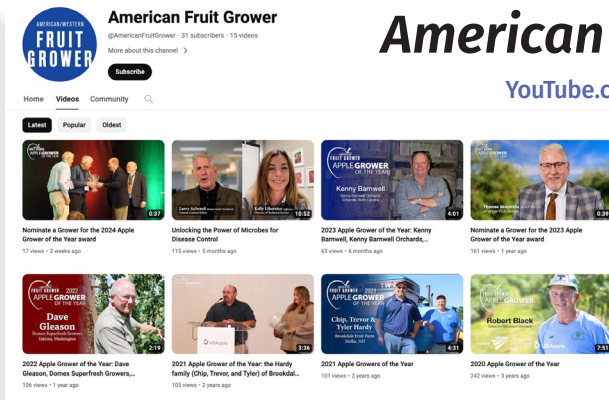


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