Breeding an almond REVOLUTION

Burchell Nursery unveils a new self-compatible almond variety

BY KEITH LORIA
CONTRIBUTING WRITER

As the third-generation owner of Oakdale, California's Burchell Nursery, Tom Burchell isn't one to rest on his laurels. He maintains a steady focus on the future, with a particular interest in nut breeding programs that have the potential to revolutionize almond cultivation.

Burchell has dedicated years of effort and significant resources to develop a new, self-compatible almond variety known as Nonpareil+. The variety, a product of extensive research and collaboration with genetics company Verinomics, is designed to be universally pollen cross-compatible with any other almond variety, enhancing its appeal to growers.

The Nonpareil+ almond is also noteworthy for being non-GMO, aligning with the growing demand for sustainable and naturally bred crops.

A little history

Burchell Nursery maintains a long tradition of breeding and introducing new varieties.

"We've always had a traditional breeding program in our nursery, ever since my grandfather started it in the '40s, looking for new varieties that would be beneficial for the industry — mainly looking at stone fruit varieties," Burchell said. "We introduced a lot of new varieties through classical breeding."

Burchell Nursery owner Tom Burchell. Photo courtesy of Burchell Nursery.

Over the years, the nursery has seen some big winners, including the O'Henry and Summer Lady peach varieties, along with almond varieties like Carmel, Monterey, Avalon and Wood Colony.

While having some intellectual property work done, Burchell told his attorney about his latest breeding programs. Burchell's attorney then introduced him to Steve Dellaporta, a professor at Yale University and founder of Verinomics, a company that focuses on agricultural genomics and gene editing. Thanks to his background, Dellaporta was able to approach Burchell's work from a genetic point of view.

The birth of an almond

"That was at the beginning of 2019, and Steve just opened my world. He brought his expertise as a geneticist to our breeding program and helped me identify these traits," Burchell said. "Before that, I had to plant the seedling and wait for it to appear phenotypically.

"Steve really sped things up for me and helped me develop trait maps for the almonds, bringing in not only the almonds we introduced but also a lot of wild-type varieties of almonds from around the world to help extend the base of almond genetic diversity and useful traits."

Burchell and Dellaporta eventually zeroed in on Nonpareil, a popular almond variety that commands a higher price in the marketplace, though they wanted to find a way to enhance the variety.

"I knew if we could make it self-fertile, that would be of great benefit to growers so they wouldn't have to plant a pollinator with the variety. That would also make the variety easier to manage and at less cost," Burchell said. "Steve said he could help with that, and he talked about gene editing and his expertise."

Dellaporta said Burchell wanted to incorporate self-compatibility into new varieties, so the first thing he did was sequence almond genomes to identify the genetics needed for self-compatibility. From there, a simple genetic marker was developed to predict self-compatible offspring.

"In developing that, we were able to tell Tom at the seedling stage which of his offspring crosses would be self-compatible several years before they would flower," Dellaporta said. "That alone saves a great deal of time and resources in developing new varieties."

Dellaporta said that since Nonpareil was the chosen focus, he was unable to do a genetic cross or traditional breeding and retain varietal identity. The only solution for making the variety self-compatible was to identify the self-incompatible gene and use a gene-editing technique — which is really just precision breeding — to create a natural mutation in the gene so it's identical to Nonpareil but self-compatible.

"You're not making any changes to the variety's identity — you're not adding DNA or changing anything except for that precise difference, which is a naturally occurring mutation in almonds," said Dellaporta. "The almond is the same, the tree is the same — the only thing that changed is the ability of Nonpareil to self-pollinate and cross-pollinate other almond varieties."

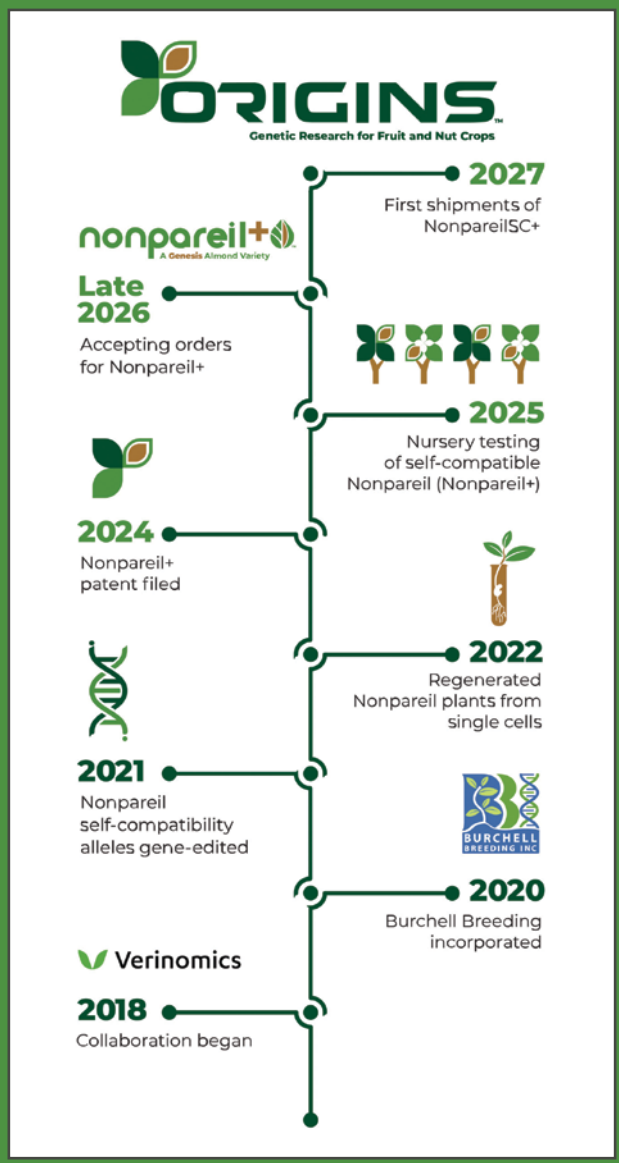

Image courtesy of Burchell Nursery.

Precision breeding isn't always easy. For instance, Burchell said some varieties work very well with Nonpareil but have a harvest window that might be 30 days later.

"You're pruning them differently, and they have different water and fertilizer requirements, things are just different management-wise," Burchell said. "Being able to have a self-fertile Nonpareil variety that is also universally cross-compatible means you don't need a pollinator. You need a lot less bees, and you have one variety you can manage. It also means you're getting full price for your orchard, not just 50%."

If a grower has an existing orchard with the old Nonpareil variety and wants to graft in the new Nonpareil+ variety, it will pollinate the old Nonpareil, making the switchover easier and faster for growers.

"As far as sustainability, it means less chemicals and dependency on bees. And think about the dust that is created

Burchell Nursery's new self-compatible Nonpareil+ almond variety is the result of years of effort and significant resources. Photo courtesy of Burchell Nursery.

going through the orchard three different times of the year — now you run through it once," Burchell said.

Looking ahead

Burchell Nursery is testing the new variety and meeting with growers to explain its benefits.

"We've invited growers, stakeholders and industry representatives to town hall events to talk about the potential for the growers and finding growers willing to test them in their orchards," Burchell said. "We expect to see higher yields on the Nonpareil+ than the Nonpareils, but that hasn't been proven yet. That's why we want to get those test trees out."

Burchell plans to start accepting orders in late 2026, with shipments slated for 2027.

"I think the future is really exciting," he said. "Steve and his team have worked out a protocol to edit other almond varieties and other traits in Nonpareil, so the door is wide open. We can look at different traits we have been collecting and discovering to continue enhancing some of these varieties in the marketplace." NNG

A graduate of the University of Miami, Keith Loria is an award-winning journalist who has been writing for almost 20 years. View his recent writing at keithloria.contently.com

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		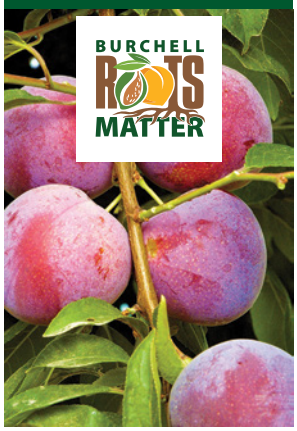	

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