



Genetic Research for Fruit and Nut Crops

ORIGINS™

NEWS

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Giving You an Edge

Burchell has a long track record of investing in the US AG market dating back to its founding in 1942.

Many of the most popular stone fruit and nut varieties have been bred and introduced by Burchell's in-house breeding program — **Burchell Breeding Inc.**

Now Burchell has launched its **ORIGINS™ Genetic Research for Fruit and Nut Crops Initiative** in collaboration with **Verinomics** — a leading genetics company.

Since 2017 this unique team has been focused on developing the most extensive proprietary library of almond traits and genetic maps of the most desirable varieties to build a more profitable future for you.

This revolutionary gene editing, **NON-GMO** breakthrough has produced a universally pollen cross-compatible almond variety — the self-compatible **NONPAREIL+**.



Knowing that the Nonpareil almond varieties bred as part of the Genesis Almond Series have the potential to deliver a greater return, Burchell has made the commitment to offer the Nonpareil+ to the US exclusively.



Burchell remains focused on its customers' success today and tomorrow.



Countdown to the Future of the Ultimate Self-Fertile Nonpareil Almond

Historically breeders check for self-fertility by planting trees for three to four years, watch and check them during fruiting and flowering cycles and determine whether they are self-fruitful or not. This trial and error process requires years and often times the crosses are not successful.

By identifying the self-incompatibility gene that blocks pollination and, through gene editing, **Verinomics** removes the incompatibility function in the plant allowing Nonpareil to pollinate itself resulting in the creation of Nonpareil+.

Nonpareil+™ a Genesis™ Almond Variety planted in an existing Nonpareil orchard will successfully pollinate with the original Nonpareil trees.

A select group of growers has been selected by **Burchell Nursery** to plant test orchards with the **new non-GMO Nonpareil+ almond** variety to give growers the confidence that the new variety is indeed self-fertile and has all the attributes of Nonpareil.



“Even tough it’s the same genetically as a Nonpareil, I still want it grafted on a rootstock in an orchard.”

TOM BURCHELL
BURCHELL NURSERY



TIMELINE TO DELIVERY

Status	Season/Year
Multiplication	Spring, Summer/2025
Greenhouse Plants	Summer, Fall/2025
Propagation	Fall, Winter/2025
Test Trees	Spring/2026
Commercial Plantings	Spring/2027



BREAKING NEWS

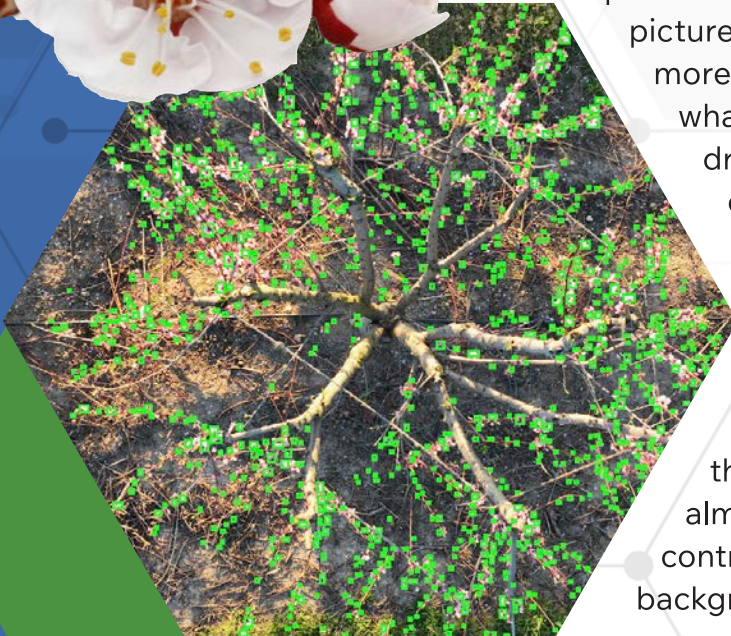


Drone, why?

I thought that was something you bought for your teenaged high school kid just to get them out of the house. It is a fun flying machine that anyone can learn. But what do you use it for? Overhead pictures of the house? Following you on a bike ride? Flying over a canyon to get a better view? Great. Put it in the box and pay for more batteries.

I wasn't even thinking of using drones in the nursery, let alone in the breeding program. But as Justin Clune, CEO of Skysense says "If you can see it the drone can see it too." Skysense sells commercial drones for taking video or pictures of specific things, using AI to interpret the images, and putting the information to work in a practical way. They use their technology to count plants in a row and other things. The drone flies a row of say, carrots, and takes a video or pictures of that row. The pictures are then sent to the AI department where programmers look at the images and identify the carrot plant from a weed or rock or anything else in that picture. After they identify 10,000 images or more of a carrot, the computer begins to learn what a carrot looks like. The next time the drone flies down the row it only counts carrots because it doesn't recognize anything else.

Can we apply that to trees? When is a tree most visibly striking? Not when it is covered by green leaves but in the spring when it is bursting fourth with thousands of beautiful flowers. For an almond tree, the white flowers stand it stark contrast to the brown branches and background. That is something a drone can see.





Starting in 2023, BBI used a drone from Skysense to fly the breeding program during bloom. The drone was programmed by Justin to fly over each tree, take a picture, then move onto the next one. Since an orchard is planted in a grid system the drone can be trained to fly the same pattern each time taking a picture over each tree at precisely the same location every time.

In the first year, we flew the drone over the breeding orchard every other day to take a picture of each tree. The images were uploaded to the computer which has been trained to recognize what a flower looks like. The computer counts the flowers on a particular tree and gives a flower count. As the bloom season progresses the bloom count steadily goes up then it tapers off and goes back down as the flowers fall off. If we look at the numbers on a graft and plot them against the drone flight dates, we can see the exact date that a particular tree had the most flowers, thus representing peak bloom.

Understanding different almond varieties comes down to a few key elements, when does it bloom, when does it harvest and how productive it is. Drone technology enables us to hone into the exact peak bloom time for the year and does not rely on a person's ability to visually look at a tree and estimate how many flowers are on that tree and when that tree reaches peak bloom. The drone takes the guess work out of the process and flies the orchard in a matter of minutes not hours if you are walking it and looking at each tree.

Here are some pictures of the drone data that we captured during bloom time. We can now use this drone to fly an orchard several times and get an understanding when the peak bloom is for that variety in that year. Talk about putting technology to work! The drone flights have saved us from hundreds of hours walking the orchard, estimating the flowers and guessing when peak boom occurs. Now we rely on drones to "See what we see" interpret the data and give us a precise bloom count that we use to know when peak bloom is for a particular variety.

We are using this technology daily in our breeding program during bloom which we use to make decisions about new varieties.



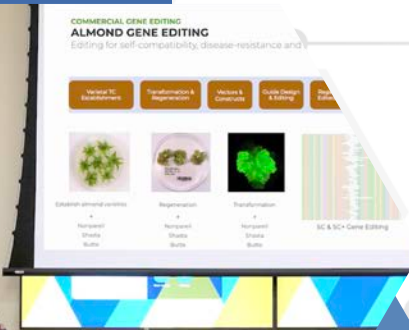
A Nonpareil+ EXCLUSIVE!

We had an amazing turnout for the three Town Halls hosted by Burchell Breeding Inc. to introduce the **Nonpareil+™ a Genesis™ Almond Variety**.

To keep all the participating growers updated on the evolution of our **Nonpareil+™ Genesis™ Almond Variety** in real time, we are publishing this ORIGINS Newsletter.

As an attendee of one of our three Town Halls you are receiving this first edition of our ORIGINS “e” newsletter which we plan to distribute quarterly.

For those who did not attend our Davis Town Hall scan the QR CODE and get the additional information that Dr. Steve Dellaporta, Professor of Molecular, Cellular and Developmental Biology at Yale University, and the Founder of Verinomix presented and William Tarantino, Partner at Morrison and Forester shared on USDA/ARS Regulatory Guidelines regarding the new **Nonpareil+ variety**.



DR. STEVE DELLAPORTA
PROFESSOR OF MOLECULAR,
CELLULAR AND DEVELOPMENTAL
BIOLOGY AT YALE UNIVERSITY, AND
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BURCHELL NURSERY

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