

Breeder profile: Chad Finn

By Audrey M. Sebolt, project assistant



Chad Finn
Photo courtesy of USDA-ARS

Strawberry was first introduced to the Pacific Northwest (PNW) in 1846 when Henderson Luelling traveled from Iowa to Oregon with his family by wagon. Luelling brought with him the cultivar 'Wilson', developed by James Wilson of New York, and this cultivar flourished in the fertile soils of the Willamette Valley, which is located along Oregon's Pacific coast. With the success of this cultivar, Luelling opened a nursery in Milwaukie, Oregon in 1850 and helped to establish the emerging strawberry industry in the PNW. Afterwards, with the development of fruit preservation by freezing and the transportation of frozen fruit in barrels to the East via railway, the PNW became known as the largest production area for quality processed strawberries.

The Oregon Agricultural Experiment Station's (OAES) breeding program began in 1911 and started cooperating with the USDA in 1928. Over the course of the U.S. Department of Agriculture-Agriculture Research Service (USDA-ARS) program's history, it has had six breeders; the current breeder is Chad Finn. While the program operates out of the USDA's Horticultural Crops Research Unit in Corvallis, OR, the program has been run cooperatively with Oregon State University for the last 90 years.

In addition to breeding strawberries, Chad breeds blackberries, red and black raspberries, and blueberries. The strawberry breeding program's primary objectives are geared toward the processed strawberry industry. The PNW industry's fruit is processed primarily as individually quick frozen (IQF) fruit, sugared and sliced fruit puree, juice, and as dried fruit. From these basic products, innumerable products throughout the grocery store are made; from premium ice cream, yogurt, and cereals to strawberry shampoo.

Therefore, the traits of interest that Chad must focus on for an exceptional cultivar include: uniform fruit size, intense internal and external color, intense flavors, high soluble solids, low pH (as anthocyanins are more stable when the pH is low and thus the reds stay red in processed products), firmness, and low drip loss (how much moisture is retained after the fruit is frozen and thawed; see pictures at right). Since strawberries are hand picked, in addition to high quality fruit, Chad must choose selections that are efficient and economically viable to harvest; these plants must bear large fruits that cap easily (see pictures at right) when picked and an open plant canopy so that the fruit can be easily seen. The PNW relies on a perennial matted row production system, so all selections must be virus tolerant and remain viable over multiple growing seasons.

Chad oversees two to three acres of strawberries and evaluates 6-8,000 seedlings each year and a substantial germplasm collection. He makes 60 to 80 crosses each spring using advanced selections and wild germplasm as breeding parents. Chad enjoys making crosses and evaluating selections in the field. He enjoys breeding strawberry because it is just a few generations from the wild and therefore it is relatively easy to introgress traits from the wild strawberry (*Fragaria virginiana* and *F. chiloensis*) into the domesticated strawberry (*F. ×ananassa*).

Frozen fruit that has thawed and is not desirable! High drip loss!



An OSU-USDA advanced selection. Low drip loss! Notice no juice!



Poor capping will not work for processing!



This cultivar caps easily!

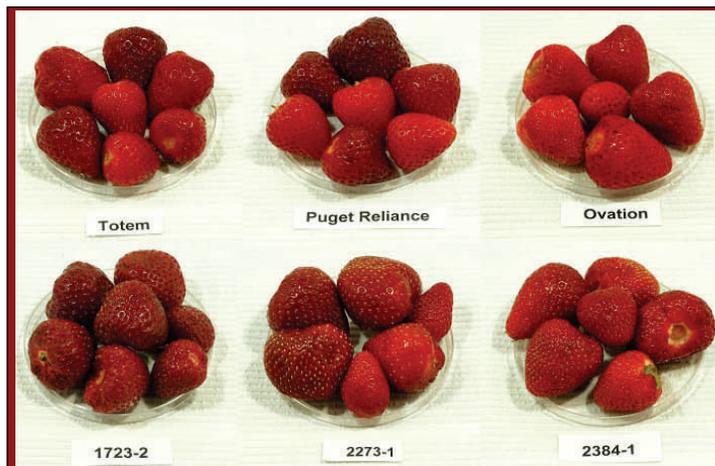


Breeder profile cont.

Chad has released a total of 30 cultivars across the crops he breeds. For strawberry he has released 'Valley Red', 'Tillamook', 'Pinnacle', 'Firecracker', and 'Independence', and helped to develop a release from Washington State University, 'Puget Summer,' and Agriculture and AgriFoods Canada's 'Stolo'. 'Tillamook', 'Firecracker', and 'Puget Summer' have been the most successful releases so far. 'Tillamook's' success has been due to its exceptional fruit quality and, as Chad states, overall it being "just about everything you would want a processing strawberry to be;" the plants have an open canopy, are high yielding, and the fruit caps easily. This cultivar has good virus tolerance and therefore a grower can potentially harvest a planting for up to four seasons. The fruit have a bright internal color, firmness, and good flavor. Fruit from 'Tillamook' are most commonly processed for IQF and polybags. 'Firecracker' is planted by growers who primarily sell at or to growers markets. This cultivar has been successful as it is late ripening and has high fruit quality.



Strawberry canopy that is ideal for hand harvesting.



A range of fruit colors in cultivars and selections; 'Totem' is ideal while 'Ovation' is too light and "orange" for processing.

Of the five crops included in RosBREED, strawberry has the shortest generation time (after the initial cross, plants bear fruit in the first or second year versus year three or four for the other crops) and is the most easily propagated. The RosBREED strawberry demonstration breeders will clonally propagate the cultivars, selections, and genotypes that will be included in their Crop Reference Set (CRS) so that the CRS can be replicated in three environments: Oregon, Michigan (Jim Hancock, RosBREED demonstration breeder), and California. The California replication will be planted and evaluated by Driscoll Strawberry Associates. Chad in the past has had an excellent collaboration with Driscoll's, but RosBREED will be taking this collaboration to a much higher level. Driscoll's and their strawberry breeder Philip Stewart have agreed to evaluate plants in the RosBREED strawberry CRS and give critical feedback.

Currently, Chad's breeding program is not using DNA markers but is working towards developing such markers so that in the future he will be able to consider selections based on marker-assisted selection (MAS). The wild diploid strawberry (*F. vesca*) is currently being sequenced with results expected to be released in 2010 by researchers in the U.S. However, the overwhelming majority of commercially grown strawberry cultivars are *F. ×ananassa*, which is an octoploid (it has eight complete sets of its chromosomes, the highest ploidy level of the RosBREED crops). Despite the ploidy and species differences, it is expected that the genome sequence of *F. vesca* in conjunction with RosBREED sequencing can be used to develop markers for commercial strawberry. Tom Davis (RosBREED strawberry demonstration breeder; University of New Hampshire) will be instrumental in making this happen. Tom is a member of the International Strawberry Genome Sequencing Consortium and a leading researcher in strawberry molecular evolution and genetics.

Chad is excited about RosBREED and states that it will make rosaceous breeders more efficient as less time and resources will be spent on inferior seedlings. Instead, these selections will have been eliminated using DNA markers. The RosBREED demonstration breeders have been introduced to the software PediMap and Chad is currently considering how this software will benefit his program and feels this software can be a powerful tool once its capabilities are fully implemented.