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NEWLY DISCOVERED GENETIC CLUES POINT THE WAY TO FIRMER CHERRIES

People have been selecting for firmer cherry fruit for a very long time. Five hundred years before Mendel documented how physical traits are passed down from parents to offspring and six hundred years before DNA was discovered to be the code behind physical traits, Spanish growers were selecting for firmer sweet cherries that could withstand a bumpy mule ride without bruising and arrive at Madrid markets still good enough to eat.

Today we have smoother ways of transporting sweet cherries, but firmness is still important for processing, as well as for meeting consumer standards for quality. In tart cherries, which are uniformly softer than sweets and primarily processed for juice and baking, fruits that are too soft are difficult to process, especially at the pitting stage. If cherry breeders can learn more about the genetics of firmness, they can apply this knowledge to improve sweet and tart cherry cultivars for both eating quality and more efficient processing. Furthermore, growers will not have to apply expensive and often unreliable sprays of plant growth regulators to enhance fruit firmness.

A handful of soft tart cherries. Firmer cherry cultivars will be easier to transport and process.

A common challenge with cherry genetics, just like other tree crops, is having enough trees for a statistically sound sample, so collaborations among research programs are extremely valuable. A team of RosBREED scientists from Michigan State University and Clemson University combined forces with scientists at the French National Institute for Agricultural Research (INRA) to tackle the question of what makes some cherry cultivars firm and what makes others soft. To strengthen their statistical analysis, the team analyzed datasets with several years of firmness measurements of four populations: the RosBREED pedigreed sweet and tart cherry populations and two sweet cherry populations grown at INRA. Together, the team was able to identify a region of the cherry genome that has a large effect on how soft a fruit gets as it ripens.

Many genes affect fruit firmness, and some have greater effects than others. The chromosome region identified in the collaborative study controls up to 85 percent of the variation in firmness for each year the three sweet cherry populations were measured. We are now much closer to understanding which genes are at work in that specific DNA region and why some cherries maintain firmness as they ripen while others soften into mush.

The next step will be narrowing down exactly which genes are responsible for fruit softening and developing a DNA test for use in breeding. The study confirmed that firmness is a recessive trait at this genetic location, so some prospective parent trees may be “carriers” of firmness genetics they can pass down to their progeny, even if they themselves have soft fruit. A DNA test will allow breeders to efficiently determine which parents to use and which seedlings to keep as they create cherry cultivars that are travel-friendly, easier to process, and good enough to eat, benefitting growers and consumers alike.

USDA United States Department of Agriculture National Institute of Food and Agriculture

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