



NEW DNA TESTING HELPS APPLE BREEDERS IMPROVE ON PROBLEMATIC HONEYCRISP

Thanks to its signature crunch and sweet flavor, Honeycrisp has become a hot commodity in the apple industry. Consumers are willing to pay premium prices for this good-eating apple, developed by the University of Minnesota. According to the U.S. Apple Association, Honeycrisp is the fifth most-sold apple cultivar in America. In Washington, the top apple-producing state, Honeycrisp was the fourth most commonly grown apple by acreage in 2017. To put it mildly, Honeycrisp is a big deal.

But once you get past the great eating quality, Honeycrisp has some flaws challenging growers, packers and shippers. The cultivar is susceptible to a physiological disorder called “bitter pit” that causes sunken lesions to appear on the fruit’s surface before and after harvest. It also shows a reaction to cold storage temperatures known as “soft scald,” in which the fruit flesh turns brown and soggy. Apples showing either of these problems can’t be sold to consumers or used for processing. That represents a huge loss in profits for growers and packing houses.

Various cultural management techniques have been developed to combat bitter pit and soft scald. Growers can spray their Honeycrisp orchards with calcium to help prevent bitter pit. Fruit held at 50 °F for a week or so after harvest before going into cold storage (at 37 °F) is much less likely to exhibit soft scald. But what a bother and expense! Other apple cultivars don’t need this special treatment. Why can’t we have apples that taste like Honeycrisp but do not need so much coddling?

This is where apple breeders and researchers in the RosBREED project have teamed up to help. RosBREED is a multi-state, multi-institution project dedicated to the genetic improvement of U.S. rosaceous crops by targeted applications of genomics knowledge and tools to accelerate and increase the efficiency of breeding programs. This Coordinated Agricultural Project is funded through the USDA’s Specialty Crop Research Initiative. RosBREED apple researchers closely examined the DNA profile of Honeycrisp and other apples and figured out which alleles (natural variants of particular genes) are responsible for susceptibility to bitter pit and soft scald, as well as the alleles responsible for Honeycrisp’s great flavor and texture.

As a result, new DNA tests are now being used by U.S. apple breeders to more efficiently combine this special flavor, firmness, and crispness with reduced storage disorders in the creation of the next great apple cultivars. This approach allows breeders to efficiently identify which young seedlings will produce fruit that meet their high standards. It saves time and money that would be spent growing up young trees only to discover after years of effort that their fruit isn’t up to snuff. The end result: an apple that the entire supply chain is happy to grow, store, and market, and consumers are excited to eat!