

Challenges and Opportunities for Honeycrisp Nutrient Management

Lailiang Cheng, Section of Horticulture, School of Integrative Plant Science, Cornell University

'Honeycrisp' is susceptible to bitterpit and biennial bearing, and fruit quality is affected by cropload to a large degree. To produce high quality Honeycrisp, tree nutrition must be carefully managed. This talk will be focused on two key aspects of 'Honeycrisp' nutrient management: improving fruit Ca level and its balance with other nutrients to reduce bitterpit and optimizing nitrogen management to balance tree vigor, biennial bearing and fruit quality.

Bitterpit development is related to Ca deficiency in fruit. However, high susceptibility of Honeycrisp to bitterpit is not completely understood. Our recent work shows that, compared with 'Gala', 'Honeycrisp' has lower Ca level, but comparable levels of K, Mg and P in fruit. The resulting nutrient imbalance as indicated by higher ratios of K/Ca, (K+Ca)/Ca and P/Ca may predispose Honeycrisps to Ca deficiency and bitterpit development. Therefore, management strategies should focus on 1) ensuring soil Ca supply and root growth for adequate Ca uptake; 2) managing competition for Ca between vegetative tissues (shoots and leaves) and fruit via controlling shoot growth and cropload; 3) balancing Ca with other nutrients such as potassium and nitrogen; and 4) making direct sprays of Ca to fruit. When Ca sprays are used to prevent bitterpit, it is important to apply enough Ca (>3 lbs elemental Ca per acre per season) and frequent sprays are more important than making sprays at a particular time during the growing season.

Nitrogen management should consider tree N demand-supply relationship and the intended management target. For tall spindle trees, high N supply is needed in the first and second leaf to promote tree growth to reach the desired height. As trees are transitioned into fruit production in the third and fourth leaf, N supplied should be lowered accordingly. Starting from the fifth leaf, N supply and tree N status should be strictly controlled to enhance fruit production and quality. For these trees, an ideal pattern of tree N status is that they have relatively high N status early in the season to promote rapid leaf area development and early fruit growth, and then the N status declines gradually to guarantee fruit quality development and wood maturity. This provides a basic framework for guiding orchard N management. N application via fertigation is preferred, which should match the high tree N demand period from bloom to end of shoot growth. If regular ground application of nitrogen is used, the best timing is between budbreak and petalfall for most soils except on sandy soils with low organic matter where multiple split applications during spring-summer period may be desirable. The rate of N application depends on soil organic matter content and tree N status. Because each orchard soil is unique and all the fertilizer field trials are site specific, the best way to fine-tune the amount of N fertilizer you should apply is to have your own N rate trial on your farm to maintain leaf N content between 2.0 to 2.2%, calm trees, and minimal level of bitterpit, and good fruit quality.