



Desmond R. Layne

Stone Fruit

The Importance Of Nitrogen

BECAUSE a fruit tree is a sessile organism (it cannot move), it depends upon its owner to properly feed it. Nitrogen is an essential nutrient for the production of amino acids, proteins, nucleic acids, etc., and stone fruit trees require an adequate annual supply for proper growth and productivity.

Nitrogen is primarily absorbed through fine roots as either ammonium or nitrate. This uptake can be affected by soil type, pH, temperature, soil moisture content, and time of year. For bearing trees, the goal of the producer should be to achieve a proper balance through fertilization so that adequate leaf and tree growth occur without compromising fruit production and quality.

Another goal should be to maintain a healthy leaf canopy well past harvest so that nitrogen in the leaves can be remobilized back into the tree before defoliation for storage as reserves that later support bloom and initial canopy development the following spring. These reserves are tapped before root uptake of soil nitrogen begins.

The Right Amount

Insufficient nitrogen reserves from the previous fall hinder spring canopy development. If this persists during the growing season, leaf and shoot growth is stunted and yield will be reduced. Premature defoliation may occur in the fall. Symptomatic leaves may appear chlorotic (yellowish) with a reddish coloration while twigs will be stunted and appear spindly with a red-colored bark. Fruits may have good red coloration but will typically be small and may have poor flavor.

Excess nitrogen can result in a shoot canopy that is much larger and denser than necessary. Too much foliage affects the penetration of sun-

light, the humidity of air within the canopy, and the penetration of foliar-applied pesticides. Negative consequences include increased disease pressure, and reduced size and coloration of fruits that may be delayed



When a nitrogen deficiency is present, leaves may appear chlorotic with a reddish coloration, while twigs will be stunted and appear spindly with a red-colored bark.

in ripening. Inadequate sunlight penetration into the inner, lower portions of the canopy may hamper flower bud initiation that could adversely affect next year's crop.

Generally speaking, using too much nitrogen is a waste of money! In addition to the negative points already noted, excess vegetative growth increases labor costs for pruning. Excess nitrogen that is not taken up by the tree can lead to environmental pollution by runoff or leaching into the groundwater.

Research Developments

Research has demonstrated that a single-dose, spring application of a high rate of nitrogen may be very inefficient. This may be due, in part, to the fact that tree demand for nitrogen from the soil is actually low at this time because most nitrogen is being remobilized from reserves within the tree itself. Heavy spring rains may leach much of the nitrogen from the zone of the soil where the absorptive feeder roots live and cool soil temperatures may limit root uptake.

Research has indicated that annual nitrogen rates can be reduced by as much as 50% without detrimental effects on tree growth and productivity. The key to achieving improved nitrogen

use efficiency is applying smaller amounts of nitrogen several times during the growing season when active growth and absorption by roots is occurring. This can be accomplished either by broadcast application of granular fertilizer to the ground or even more efficiently through low-pressure microirrigation systems where water-soluble nitrogen forms are used (fertigation).

The real question is when to make these applications. In ongoing research at Clemson University in my peach systems trial project, I am collaborating with Clemson root physiologist,

Dr. Christina Wells. We have installed 72 minirhizotrons (underground root observation tubes) to monitor peach root growth throughout the season. We hope to time fertilizer applications with the periods of root "flushing" and to correlate this with above-ground phenological growth stages (i.e., full bloom, shuck split, pit hardening, final swell, postharvest, etc.). The long-term goal is to be able to precisely time fertilizer applications with the period when fertilizer is most needed by the tree.

Finally, research in California and Italy has indicated that postharvest nitrogen fertilization using foliar applications of urea in the fall provides a good supplement to build tree reserves with minimal detrimental environmental impact. This would not be suitable in colder Northern climates because it could delay hardening off and result in winter injury. ●

Desmond R. Layne, Ph.D. is an Associate Professor of Pomology and Tree Fruit Specialist in the Department of Horticulture at Clemson University in South Carolina. E-mail questions or comments about this article to dlayne@clemson.edu, or go to www.clemson.edu/hort/Peach/index.php.

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