

Review

Basics of Fertility Management for Apples and Peaches



UNIVERSITY OF ILLINOIS
EXTENSION

College of Agricultural, Consumer and Environmental Sciences

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Optimum nutrient levels

- Developing a nutrient management program
- Differs for perennial crops
 - Consider nutrient demand-supply relationship throughout the season



Nitrogen

- When trees require larger amounts
 - Early season canopy development
- Only a minimum supply
 - Fruit quality development
 - Adequate cold hardiness
- Nitrogen sources
 - Reserve N in the tree from the previous season
 - Readily available for initial growth in the spring
 - Main support for spur leaf development and early fruit development

Nitrogen continued

- Nitrogen sources
 - N supply from soil mineralization
 - when the chemical compounds in organic matter decompose or are oxidized into plant-accessible forms
 - Provides substantial amounts of N to trees grown on soils with high organic matter
 - Nitrogen fertilizers applied to the soil or foliage
 - Use soil and leaf analysis to help diagnose tree nutrient status and soil nutrient availability
 - Make adjustments on fertilization program

Soil analysis

- Useful to determine
 - Lime requirements
 - Mineral availability in the soil prior to orchard establishment
 - For established orchards...
 - Combine to interpret leaf analysis results
 - Modify fertilization programs
 - Sample separately the topsoil and the subsoil

Preplant soil preparation

Foliar symptoms for Mg deficiency
on young apple tree



Courtesy of Kearneysville Fruit Research and Education Center

- Liming
 - Maintain in the range of 6.0 to 6.5 throughout the soil profile
 - pH of topsoil (0-8 inch depth) adjust to 7.0
 - Adjust subsoil (8-16 inch depth) to 6.5
 - Also ensures adequate soil calcium and magnesium
 - Use high-Mag lime if soil magnesium levels are below the desired levels
 - 450-950 lbs Mg/acre topsoil (coarse → fine textured)
 - 250-550 subsoil
 - Harrow thoroughly into the soil surface before plowing down as deeply as possible
 - For large amounts, plow down 2/3 followed by thoroughly harrowing the remainder into the topsoil.

Other preplant nutrients

- Potassium
 - 330-520 lbs K_2O /acre topsoil (coarse → fine textured)
 - 200-300 subsoil
 - [(desired level topsoil – actual level) + (desired level subsoil – actual level subsoil)] = lb./acre K_2O per 16" depth
- Nitrogen
 - 40 lb./acre for cover crop establishment
 - Another 40 lb./acre when cover crop is plowed down and permanent sod is seeded
- Boron
 - If Boron levels are in the low to medium range, apply preplant 2 to 3 lb./acre
 - Low (<0.4 to <0.8 lbs/a), Medium (0.4 to 1.6 lbs/a)

Fertilizing Young Trees

- Immediate supply of water to settle soil around roots
 - Nitrogen fertilizer not recommended at this time
 - Initial growth comes from tree reserves
 - Soil nutrient uptake is delayed due to the damaged root system
 - Applying dry fertilizer at this time may damage roots
 - First nitrogen application at budbreak
 - Soil applied
 - 0.6 to 1.0 ounce of actual N per tree
 - Same rate applied again 4 weeks after budbreak
 - If fertigation is an option
 - 100 ppm N in all water applied through drip for 8 weeks

Fertilizing Young Trees cont...

- **First nitrogen application at budbreak cont...**
 - Foliar sprays to improve early season tree growth
 - 2 to 3 sprays at 10-14-day intervals beginning 3 weeks after bud break
 - 6 lbs urea per 100 gal water
 - 2 additional sprays prior to leaf fall
 - 25 lbs per 100 gal water
- **In the second year when new shoots begin rapid growth**
 - Apply 0.1 to 0.2 lbs of actual N per tree and a similar foliar N spray program as in year 1
 - If fertigating, continue with 100 ppm N

Fertilizing Established Orchards

- Leaf sampling
 - Indicated concentrations of nutrients in the foliage
 - Leaf samples should be collected between 60 and 70 days after petal fall (usually late July to early August)
 - Collect mid-shoot leaves from current season terminal shoots on the periphery of the tree
 - Each sample should consist of about 100 leaves from several trees in the sampling area
 - Don't mix leaves from different cultivars, soil conditions, tree vigor or crop load
- Limitation of leaf sampling
 - Fairly late in the season to make corrections

Maintenance program

- Suggested when leaf analysis shows no nutrient deficiency

Timing	Foliar Sprays	Ground Application
Green tip	1 spray of 2-4 lbs of a fixed copper product per 100 gal	
Tight cluster to pink	1 spray of tank mixed 3 lbs urea and 1 lb Solubor/100 gal	Apply 20-40 lbs actual N/acre to soil
Petal fall to early cover sprays	1 spray of Zn-EDTA at label rate at second cover Plus 1 spray of 3-4 lb of calcium chloride/100 gal at third cover Plus 2 sprays of 10-15 lb of Epsom salt/100 gal at petal fall, and second cover	Apply 40-60 lbs of K ₂ O/acre to soil at petal fall
End of shoot growth to harvest	3 to 4 sprays of 3 to 4 lbs of calcium chloride/100 gal at 14-day intervals for bitter pit susceptible varieties	
After harvest		Apply 40-60 lbs of K ₂ O/acre to soil Plus Every 2 to 3 years, apply appropriate amount of lime determined from soil analysis

Corrective program

- Suggested when leaf analysis shows nutrient deficiency

Timing	Foliar Sprays	Ground Application
Green tip	1 spray of 2-4 lbs of a fixed copper product per 100 gal	
Prebloom period	2 sprays of tank mixed 3 lbs urea, 1 lb Solubor and Zn-EDTA at labeled rate per 100 gal; One at ½" green and the other at tight cluster to pink	Apply 40-60 lbs actual N/acre to soil
Petal fall to early cover sprays	2 sprays of 5 lbs urea/100 gal at petal fall and first cover Plus 2 sprays of Zn-EDTA at label rate at petal fall and second cover Plus 2 sprays of 1 lb solubor/100 gal at first and third cover Plus 3 sprays of 10-15 lb of Epsom salt/100 gal at petal fall, first and second cover Plus 1 spray of 3 -4 lbs calcium chloride per 100 gal at third cover	Apply 60-150 lbs of K ₂ O/acre to soil at petal fall
End of shoot growth to harvest	5 to 6 sprays of 3 -4 lbs of calcium chloride/100 gal at 14-day intervals	Apply 60-150 lbs of K ₂ O/acre to soil at the end of shoot growth
After harvest	2 sprays of 25 lbs of urea/100 gal at 7 to 10-day interval Plus 1 spray of 1 lb of actual copper/acre as copper sulfate	Soil application of 60-150 lbs of potassium/acre as sulfate of potash-magnesia Plus Soil application of dolomitic lime to increase calcium and magnesium supply based on soil and leaf analysis

End with foliar application comments

- Compatibility
 - Generally, urea, Solubor and Zn-EDTA are compatible
 - Urea and Epsom salts has sometimes injured young apple foliage
 - Epsom salts and some of the boron products may increase *pH* of the tank mix
 - Adjust *pH* before adding *pH*-sensitive pesticide
 - Do not tank mix boron product with pesticides contained in water-soluble plastic packages
 - Inhibits dissolution of the plastic
 - In general, foliar nutrients should not be mixed with oil
 - Particularly Solubor
 - Epsom salts, Solubor and ZN-EDTA are compatible for use in postbloom sprays
 - Not usually sprayed together though; more common to spray two together

Foliar application cont...

- Compatibility cont...
 - Calcium chloride may be physically incompatible with Epsom salts
 - Resulting in plugged nozzles
 - Calcium chloride cannot be tank-mixed with Zn-EDTA
 - Can result in Zn phytotoxicity
 - Always test a new Zn-chelate product on a few trees first to see if any phytotoxicity occurs

Questions?

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