



FACTSHEET

Fruit Program

Integrated horticultural and pest management of fruits in Massachusetts

Prebloom Nutrient Applications for Apple Trees

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Maintaining adequate levels of mineral nutrients in trees is an essential aspect of orchard management. Soil and foliar applications of these elements should occur only after careful observation of tree growth, bud and leaf quality, yield, and fruit quality and after measurement of concentrations within the tree (through leaf analysis). With regular observation and annual application, nutrient levels can be optimized and tree performance can be maximized. However, environmental or management conditions often interfere with this process, resulting less than optimal nutrient concentrations. Soil applications and postbloom foliar applications often can correct these deviations, but one of the most critical phases of development in an apple tree is from the time growth begins through bloom, since much development of floral parts occur during this period and the ability of flowers to set fruit is determined. Prebloom nutrient applications can be used to supplement nutritional programs during this critical phase. Specific elements that can be targeted during this time are nitrogen, boron, zinc, and copper. The information included in this factsheet was derived from *Orchard Nutrition Management* by Warren Stiles and Shaw Reid (Cornell Cooperative Extension Information Bulletin 219).

Nitrogen (N)

Nitrogen is a major element, required by all plants. Prebloom applications of nitrogen can be used to supplement an existing nitrogen management program. Prebloom timing benefits the tree by providing the rapidly developing flower and leaf buds with an adequate supply of nitrogen. Timing is between the tight-cluster and pink stages of bud development. Use a grade of urea that has less than 0.25% biuret at a rate of 3 lbs per 100 gallons.

Urea

tight cluster – pink

Apply at 3 lbs/100 gal. Urea must have less than 0.25% biuret.

Boron (B)

Boron is a required element, but only in small amounts (35-50 ppm in leaf tissue). General programs include annual soil applications in the early spring or annual foliar applications in the first and third cover sprays. If leaf levels are low (less than 35 ppm) or if there is a desire to enhance the levels of boron for developing buds, a prebloom spray can be used. Timing is at the tight-cluster stage of bud development. Any spray-grade boron source can be used.

Solubor® is the most commonly available. Do not use Solubor®, however, with pesticides in soluble plastic bags, since it will alter the bag's ability to dissolve properly.

Solubor®	tight cluster	Apply at 1 lb/100 gal. Do not exceed 8x concentration.
Other sources	tight cluster	Apply at 0.1-0.2 actual B/100 gal.

Copper (Cu)

Copper is a required element for plant growth. Apple trees need it in very small amounts (7-12 ppm in leaf tissue). The only recommended method for delivering copper to apple trees is through a prebloom foliar spray. Specifically, copper can be provided by Bordeaux mix or fixed-copper fungicides (copper hydroxide, copper oxychloride sulfate, copper tetracalcium oxychloride, and tribasic copper sulfate) used at label rates. The timing for application is before the full green-tip stage of development. Later applications risks russetting of fruit. Some fixed-copper formulations are labeled for application much closer to bloom and at much lower rates. The potential nutritional value of these treatment is unknown.

Fixed-copper fungicides	green tip	Use label rates, add 2 lbs hydrated lime per 100 gal to reduce russetting and 1 qt oil per 100 gal finished spray solution to enhance efficacy.
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Zinc (Zn)

Zinc, like copper and boron, is a micronutrient, i.e. it is required only in small amounts (25-50 ppm in leaf tissue). Zinc can be provided partially by zinc-containing fungicides, but if zinc levels are low, additional material should be applied. Zinc sulfate is a potential source. It should be applied before silver tip, but interaction with frost or oil sprays can result in significant damage to the tree. Chelated zinc is more safe and is the recommended approach for delivering zinc. Several forms are available, but few have been tested with apple trees and may result in damage. EDTA zinc chelates are the preferred materials. Prebloom timing can provide zinc at the critical stages of bud development.

EDTA zinc chelates	tight cluster	Apply at label rates.
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Prebloom Tank Mixes

Nitrogen, boron, and zinc can be applied in a prebloom tank mix at tight cluster. These elements together may enhance bud quality, improve the ability of the buds to overcome cold damage, and enhance fruit set.

Urea (<0.25% biuret)	3 lbs/100 gal
Solubor®	1 lbs/100 gal
EDTA zinc chelate	At label rates