



## APPLES (Oregon)

Observations of annual shoot growth and size and color of leaves and fruit are helpful to an orchardist in determining the fertilizer needs of his trees. In addition, leaf analysis indicates which elements are present in adequate, deficient, or excessive amounts. Soil analysis before planting is useful in predicting the need for potassium, magnesium, or lime applications.

### NITROGEN (N)

Young trees (dwarf or standard)

Age	Apply this amount N (lb/tree)
1 yr	Usually None
2	1/4 if growth poor
3 - 5	1/4 - 1/3
6 - 7	1/3 - 1/2
8 - 10	1/2 - 3/4

Apply N according to terminal growth. Young trees should grow 18-30 inches annually. 1 and 2 year old trees can be injured if N is applied in a band around the tree.

Mature trees (standard) all varieties in sod

Leaf analysis guide for N application

% leaf N in August	Apply this amount N lb/tree
Under 1.5 (severe deficiency)	1 1/2 - 2
1.5-2.0 (deficiency)	1 - 1 1/2
2.0-2.3 (optimal)	1 - 1 1/4
over 2.3 (excess)	none

Note: For mature dwarf trees use the same fertilizer per acre as for standard trees and adjust according to growth and leaf analysis.

Apply N in a 1-2 foot band under drip line or increase 20-30% for a broadcast application. Adjust rates according to results of application in previous years. Less N is needed in clean cultivated orchards.

N applications should be made during the period after leaf fall in autumn and petal fall in spring. Fall application can increase danger of winter freeze damage in areas in which sub zero temperatures may occur.

### PHOSPHORUS (P) AND SULFUR (S)

Deficiencies of P and S have not been observed in Oregon apple orchards.

### POTASSIUM (K)

K deficiency has been observed in very few Oregon apple orchards.

Leaf analysis guide for K application

% leaf K in August	Apply this amount K <sub>2</sub> O lb/tree
Under 0.9 (deficiency)	10-15
0.9-1.2 (borderline)	6-10
over 1.2 (optimum)	none

Preferably drill K 6-8 inches deep in root zone; or place K in concentrated band on soil surface.

### MAGNESIUM (Mg)

Severe Mg deficiency does occur in some Oregon apple orchards.

Leaf analysis guide for Mg application

% leaf Mg in August	
Under 0.18	severe deficiency
0.18-0.22	moderate deficiency
0.23-0.24	borderline
over 0.24	optimum

### Treatment

Deficiency symptoms appear as blotchy dead areas on older leaves in late summer and fall.

Sprays consisting of either 1 gal of magnesium nitrate or 4 lbs calcium nitrate plus 6 lbs Epsom salts per 100 gals of water have been effective in some trials in Hood River, but have injured Newtown apples. Five lbs of magnesium oxide per 100 gals of water also looks promising.

Applying 2 to 3 tons/A of dolomite lime is suggested as another treatment.

### BORON (B)

Leaf analysis guide for B applications

ppm B in leaves	Apply this amount B lb/tree
Under 20 (deficiency)	0.10-0.15
20-30 (borderline)	0.10
30-80 (optimal)	0.10*
80-100 (excess)	none
over 100 (toxicity)	none

\*Maintenance application every 3 years.

Do not apply B to non-bearing trees. Reduce rates per tree by one-half or more for young bearing trees since trees are easily injured by excessive B applications.

If B deficiency has occurred, spray application may give more rapid recovery than soil application. One preventive spray per year has been as effective as periodic soil applications.

Spray at rate of 8 lb sodium pentaborate/A using 2 lb sodium pentaborate/100 gal of water. Spray twice if deficiency has occurred; fall application (before leaves drop) plus prebloom application (3-4 days before blossoms open) or prebloom application plus first cover spray.

### ZINC (Zn)

Deficiency symptoms are most reliable indication of need for Zn. If several elements are deficient symptoms may not be clearly recognized. Symptoms occur early in tops of trees primarily. Shoots have a tuft or rosette of comparatively larger leaves at the tip with smaller, narrow, sometimes chlorotic leaves below.

If leaf Zn levels in August are below 17 ppm, a deficiency is suspected. Soil applications will not correct Zn deficiency.

#### Application of Zn

Dormant sprays: Apply Zn sulfate at rate of 15 lb Zn (45 lb or 32% Zn sulfate crystals or 13 gal liquid Zn sulfate)/A. The dormant application should be made as late as possible in dormant season before any visible green appears. (Caution: Be sure all crystals of Zn have dissolved before spraying.)

After harvest sprays: Apply after harvest when leaves are still green and active. Apply 10 lb Zn (30 lb 32% crystals or 8 gal liquid)/A.

Non-bearing trees: Apply Zn sulfate spray, using approximately 1/2 lb Zn (1 1/2 lb 32% crystals or 1/2 gal liquid)/100 gal of spray to non-bearing trees as soon as deficiency is

recognized. Foliage should be thoroughly wetted.

A spray of Zn chelate at 2-3 lb/100 gal 10-14 days following petal fall may be substituted for dormant Zn sulfate spray. In severe cases, a second spray may be required.

### NEW ORCHARDS

Soil sampling and testing of fields to be planted to orchards is recommended. Application and incorporation into soil of certain nutrient elements such as K and Mg can be best done prior to planting.

### POTASSIUM (K)

K should be broadcast and plowed under during preparation of land for planting.

If the OSU soil test for K reads (ppm):      Apply this amount (lb/A)  
 $K_2O \times 0.83 = K$

0 to 150	300-400	250-330
150 to 300	200-300	165-250
over 300	none	none

The K content of fertilizer is expressed as the oxide ( $K_2O$ ) on fertilizer labels. Multiply  $K_2O$  by 0.83 to convert to K.

### MAGNESIUM (Mg)

Mg should be broadcast and plowed under during preparation of the land for planting.

If the OSU soil test for Mg is less than 0.5 me/100g of soil, apply 2-3 T/A of dolomite. Dolomite acts in a similar manner to limestone in the correction of soil acidity.

### LIME

Liming of orchard soils is most effective where the lime is mixed into the soil to as great a depth as feasible during the preparation of the land for planting.

If the OSU soil test has a pH of less than 5.2, apply ground limestone at the rate of 2 T/A.

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K, Mg, and lime recommendations for new orchards are based on soil test values from the Soil Testing Laboratory, OSU, Corvallis, Oregon.

These recommendations are based on research findings in many states and observation of responses in commercial orchards in Oregon, including leaf analysis.

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