



Oregon State University Fertilizer Guide for

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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.

A nutrient deficiency should be suspected if the cause of poor tree performance is not primarily one or more of the following:

<i>lack of pruning</i>	<i>poor pollination</i>	<i>disease</i>
<i>winter injury</i>	<i>deep cultivation</i>	<i>insects</i>
<i>physical injury</i>	<i>soil borne pests</i>	<i>rodents</i>
<i>poor weather</i>	<i>poor soil drainage</i>	
<i>shallow soil</i>	<i>limited moisture</i>	

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

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

Mature trees (standard) - in sod

Leaf analysis guide for N application

% leaf N in August		
Golden Delicious	Non-Spur Delicious & others	Newtown
<1.6	<1.8	<2.2 deficient
1.6-1.8	1.8-2.0	2.2-2.4 below normal
1.8-2.1	2.0-2.3	2.4-2.7 normal
>2.2	>2.3	>2.7 above normal

Adjust rates of N application to achieve a normal level of leaf N in mid August. Tree size, soil type, cover crop, pruning and other factors influence N fertilizer rates required to achieve a normal N level. The amount of N required ranges from none to about 2 lbs per tree.

Spur-type trees usually need above normal N levels to grow satisfactorily.

Above normal N gives poor quality, green goldens and late-coloring non-spur reds.

Apply N in a 2-3 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 before 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.

Since K applications tend to reduce magnesium uptake, do not apply K unless leaf analysis indicates a deficient or borderline level of K.

Leaf analysis guide for K application

% leaf K in August	Apply this amount of Potash (K ₂ O)-(lbs/A)
Under 0.9	(deficiency) 10-15
0.9-1.2	(below normal) 6-10
Over 1.2	(above normal) None

K levels in the leaves often do not increase until the year following application. A single application is usually effective for 2 or more years.

Submit soil sample from 0-6 inch depth for lime requirement test and lime to pH 5.6 in band where K is applied.

Preferably drill K 6-8 inches deep in root zone, or place K in concentrated band 2" wide for each lb K₂O applied on soil surface at drip line.

Chloride toxicity can occur where muriate of potash (KCl) is used and subsequent rainfall or irrigation is inadequate to leach chloride out of the surface soil. Where chloride toxicity is a potential problem other K sources such as sulfate of potash can be used.

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	deficiency
0.18 - 0.22	below normal
Over 0.22	normal

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

Where Mg is needed, broadcast 1 T/A of dolomite. Dolomite equals ground limestone in reducing soil acidity.

BORON (B)

Leaf analysis guide for B application

<u>ppm B in leaves</u>		<u>Apply this amount of B lb/tree</u>
Under 20	deficiency	0.10-0.15
20-30	below normal	0.10
30-80	normal	0.10*
80-100	above normal	None
Over 100	excess	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. 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 15 ppm, a deficiency may be more likely to occur the following spring. *Soil applications will not correct Zn deficiency.*

Application of Zn

Dormant sprays: Apply Zn sulfate at rate of 15 lb Zn (40 lb of 36% 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 (25 lb 36% crystals or 8 gal liquid)/A.

Non-bearing trees: Apply Zn sulfate spray, using approximately 1/2 lb Zn (1 1/2 lb 36%

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 or 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.

<u>If the OSU soil test for K reads (ppm):</u>	<u>Apply this amount of Potash (K₂O)-(lbs/A)</u>
0 to 150	300-400
Over 150	None

MAGNESIUM (Mg)

Mg should be broadcast and disced in during preparation of the land for planting if the OSU soil test for Mg is less than 0.5 meq/100g of soil. Dolomite lime can be used to supply Mg as indicated in the section on lime.

The need for applications of Mg is usually greater where K and calcium levels in the soil are high.

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. The application of lime is not suggested if the soil pH is 5.6 or higher.

<u>If the OSU SMP Buffer test for lime reads:</u>	<u>Apply this amount of lime (T/A):</u>
Below 5.2	4 - 5
5.2 - 5.5	3 - 4
5.5 - 5.8	2 - 3
5.8 - 6.2	1 - 2
Over 6.2	0

The liming rate is based on dry 100-score lime. Lime should be mixed into the seedbed at least several weeks before seeding. *A lime application is effective over several years.*

For acid soils low in Mg (less than 0.5 meq Mg/100g of soil) one ton/A of dolomite lime can be used as a Mg source. Dolomite and ground limestone have about the same ability to neutralize soil acidity.