

## Apples

### • Young trees

Adequate supplies of nitrogen are needed to promote rapid growth and development of young nonbearing trees. Optimum terminal growth should be 20 to 36 inches annually. One and two-year old trees may be injured if N is banded around the tree. Use Table 26 as a guide to N applications to young apple trees.

**Table 26.**  
Suggested nitrogen application rates for apple trees in the first seven years after orchard establishment.

Tree Age	N Application Rate
	lbs./acre
1	None to 25
2	25 - 50
3 - 5	25 - 75
6 - 7	40 - 100

Nitrogen should be applied in late winter to early spring but not after June 1. Nitrogen should be applied directly in the irrigation water or else placed such that water movement will carry soluble N into the root zone.

### • Mature orchards

The overall vigor of the tree and appearance of the leaves are the best indication of nitrogen status. Annual terminal growth should be 10 to 14 inches.

Determination of the N concentration in leaves from current season growth can also be useful in estimating tree N status. Samples should be collected between July 1 and August 1 from leaves which are free of insect, disease or mechanical damage. Collect leaves from several sides of the main tree but avoid sampling from suckers or water sprouts. Do not collect more than two leaves per shoot and select leaves from the middle of the current season growth (Figure 22). Sample so that the petiole remains attached to the leaf blade. Collect about 100 leaves from randomly selected trees within the block to be tested.

Tree vigor and leaf N value must be considered together to make a meaningful assessment. Above normal vigor and high leaf N indicate over fertiliza-

tion with N. Below normal leaf N and poor vigor indicate a nitrogen deficiency. Above normal leaf N and low vigor suggest that another factor is limiting tree growth. Low leaf N and high vigor can occur on trees with poor fruit set.

**Table 27.**  
Interpretation of nitrogen levels in apple leaf tissue samples. Somewhat higher leaf N levels may be needed for Granny Smith trees.

Leaf Tissue Nitrogen Content	Nitrogen Status
%	
Below 2	Deficient
2 - 2.5	Adequate
Above 2.5	Excess

Excess N can result in poor quality, increased incidence of bitter pit and late-coloring in nonspur reds. Reduce N rates where trees are crowding and pruning is required to restrict tree size.

The annual nitrogen requirement for mature, low density orchards ranges from none to about 2 lbs. N per tree. Higher density plantings require less N per tree but have similar requirements per acre.

Use caution when applying all-ammonium ( $\text{NH}_4^+$ ) N sources such as anhydrous ammonia, aqua ammonia and ammonium sulfate to spur-type Red Delicious apples grown on noncalcareous, or acidic soils. These N forms can accentuate manganese (Mn) uptake resulting in Mn toxicity, also referred to as apple measles.

Foliar applications of low (<2%) biuret urea may be used to supplement soil applications of N. To reduce the potential for tree injury do not use rates over 3 to 5 lbs. of urea per 100 gallons of water, or more than 10 to 20 lbs. urea per acre.

The timing and method of N applications which are best for mature trees are the same as presented above for young trees.

### • Nutrient removal

A harvest of 800, forty-pound boxes of apples per acre will contain about 25 lbs. N.



**Figure 22.** Collect leaf tissue samples for nutrient analysis during the month of July. Sample whole leaves from the middle of the current season growth as shown above.