



# FRUITS & VEGETABLES

## Fertilizing Fruit Trees

7.612

C.E. Swift<sup>1</sup> (7/09)

### Quick Facts...

A lack of adequate nutrients affects tree growth and fruit production.

Fruit trees can be fertilized with nitrogen fertilizer based on their annual growth rate or a soil analysis.

Most fruit trees require a yearly foliar spray of zinc.

A soil analysis can determine other nutrients needed by fruit trees.

Applying nutrients that are not needed can cause a nutrient imbalance.

### Introduction

Fruit trees are fertilized to ensure continued growth and fruit production. In the backyard orchard, proper pruning in addition to the application of nitrogen in the spring prior to or at bud break helps maintain this productive status. Other than nitrogen and zinc, iron and manganese may limit growth due to our alkaline soil conditions. Apply nutrients based on a soil test analysis conducted by the soil testing lab at Colorado State University or another analytical lab of your choice.

The amount of nitrogen to apply can be based on how much shoot growth occurred the previous season or on a soil analysis. Reduced fruiting wood and reduced fruit production results when the growth rate is less than what is recommended in Table 1.

**Table 1: Annual Growth Rate.**

Nonbearing Trees	Last Year's Annual Growth Rate
Apple	12 to 36 inches
Pear	15 to 30 inches
Peach & Nectarine	18 to 24 inches
Tart Cherry	12 to 24 inches
Plum & Sweet Cherry	12 to 36 inches
Bearing Trees	
Apple Non-Spur	6 to 18 inches
Apple Spur-type	6 to 10 inches
Pear	12 to 16 inches
Peach & Nectarine	12 to 18 inches
Tart Cherry	~ 8 inches
Plum & Sweet Cherry	~ 8 inches

**Colorado  
State  
University**

**Extension**

### Identifying Annual Growth

Each year of growth can be identified by the ring of bud scale scars remaining when the bud at the tip of the shoot grows. A difference in color and/or bark texture is typically evident above and below the annual growth ring. Check last year's annual growth rate at several points around the tree to determine the average length of last year's growth. Use the average length of annual growth to determine if and how much nitrogen should be applied.



Figure 1: Annual Growth Ring – Apple



Figure 2: Annual Growth Ring - Pear



Figure 3: Annual Growth Rings - Apricot



Figure 4: Annual Growth Ring - Sweet cherry

## Applying Nitrogen Based on Annual Growth Rate

Stone fruit trees (i.e. peach, cherry, plum and nectarines) can be fertilized at a maximum rate of 1/8 pound of nitrogen per inch of trunk diameter (measured 1 foot above ground level). Apply this amount if the tree's annual growth is on the low end of the recommendation given in Table 1. Apply less fertilizer if the previous season's growth rate falls in between the recommended growth increments. If too much nitrogen is applied it can lead to excessive leaf and tree growth over fruit production.

The maximum rate of nitrogen to apply to pome fruit trees (apples and pears) is 1/10th pound of nitrogen per inch of trunk diameter (measured 1 foot above ground level). Apply this amount if growth the previous year was at the low end of the recommended rate. As with stone fruits, apply less nitrogen the closer the actual growth rate approximates the recommended growth rate.

Maintain a record on the amount of nitrogen applied each year and the resulting growth. Such records provide a guide for the amount of nitrogen fertilizer to apply to achieve the desired results.

## Applying Nitrogen Based on a Soil Analysis

If a soil analysis has been conducted, the recommendations in Table 2 indicate the amount of nitrogen to apply.

**Table 2: Nitrogen requirements based on a soil test.**

Soil Test Value NO <sub>3</sub> N ppm	Pounds of Nitrogen to apply per 1,000 square foot area when percent organic matter is:					
	0-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6+
0.0-3.0	4.1	3.8	3.4	3.1	2.8	2.1
3.1-6.0	3.9	3.6	3.2	2.9	2.5	1.8
6.1-9.0	3.7	3.3	3.0	2.6	2.3	1.6
9.1-12.0	3.4	3.1	2.8	2.4	2.1	1.4
12.1-15.0	3.2	2.9	2.5	2.2	1.8	1.1

*Note: The above information is specific to apples and pears. Add 0.2 pounds per 1,000 square foot area for peaches, nectarines, apricots and plums and 0.4 pound per 1,000 square foot area for cherries.*

## Calculating the Amount of Fertilizer Applications

Fertilizer products contain specific quantities of nutrient based on percentage by weight. This is indicated on the product label such as 15-1-1. The first number (15) is the percentage by weight of nitrogen, the second number is the percentage by weight of phosphorus (P<sub>2</sub>O<sub>5</sub>) and the third is the percentage by weight of potassium (K<sub>2</sub>O). For example, ammonium sulfate (21-0-0) contains 21 percent nitrogen while blood meal contains 12 percent to 13 percent nitrogen. The amount of the fertilizer product needed is calculated by dividing the pounds of nutrient needed by the percent of that nutrient in the product.

For example, if you need 1/2 pound of nitrogen for a given area and are using a product with 15 percent Nitrogen, divide .5 (one-half pound) by .15 (the percent of N in the product). This tells you 3.33 pounds of this product are needed to apply 1/2 pound of nitrogen.



Figure 5: Annual Growth Ring – Peach.



Figure 6: Annual Growth Ring – Italian Plum



Figure 7: Annual Growth Ring – Santa Rosa Plum.

## Pruning and Excessive Irrigation

Pruning the same amount each year will result in the same amount of stimulated growth. If the tree is pruned more severely, apply less nitrogen fertilizer. This will help avoid excessive growth.

Irrigating too frequently or too much at one time, as is common with fruit trees planted in turf areas, stimulates growth and subjects fruit trees to possible root rot diseases. Take into account excessive irrigation and correct if possible. Eliminating the grass around the base of a fruit tree and applying a thin layer of mulch is recommended. Kill the grass with a glyphosate product, horticultural vinegar or fatty acid product such as Scythe before applying mulch.

It is highly recommended to plant the backyard fruit orchard away from turf where the trees can be watered and fertilized based on their needs and not that of turfgrass.

## Calcium

Bitter-pit and cork spot in apples (Figure 8) is a direct result of the inability of the tree to move adequate calcium into the fruit. Small brown lesions up to ½ inch (10 mm) in diameter appear on the fruit. The area below the skin becomes dark and corky. These spots may appear at harvest or during cold storage. Young vigorous trees with few fruit and trees that are over irrigated and over fertilized are more susceptible to this disorder. Calcium sprays are formulated by adding calcium chloride to water at the rate of 3 to 4 pounds per 100 gallons or 0.63 ounces per gallon of water (*see Fact Sheet no. 7.615, The Preparation of Small Spray Quantities of Pesticides.*) Apply the first spray about mid-June, a second in mid-July, and a third in mid-August. Trees not affected by this condition will not need this treatment.

## Iron

Iron deficiency symptoms result in the leaves at the end of the branch being yellow or light green with a network of deep green veins. Margin leaf burn may be evident. This deficiency often results in reduced fruit yields and poorly colored fruit with a flat taste. Apply chelated iron at the rates recommended in Table 4. To help correct this problem, avoid over irrigation and improve the organic content of the soil.

## Zinc

Zinc deficiency symptoms are common in Colorado. Since soil applications of zinc have not proven effective, the application of a zinc spray prior to bud break in the spring is recommended. However, applications made within three days (five days for apples) before or after an application of horticultural or dormant oil can cause injury and should be avoided. In this case, except for apricots, apply the zinc in the fall, after October 10. Mix 1 tablespoon of zinc sulfate in a gallon of water. Thoroughly cover the tree with the spray and apply the spray until the bark is no longer able to hold the spray and spray runs off the tree.

## Other Nutrients

Other than the application of nitrogen and zinc as described above, base the application of the other nutrients on the results of a soil analysis. Foliar sprays of micronutrients can give remediation for the season if started in April-May and continued until June-July. Miracle-Gro, or a similar water soluble fertilizer can be used for this treatment. Read and follow the label directions on the fertilizer container.



Figure 8: Bitter-pit and cork spot on Honeycrisp apple.

#### References

Childers, N.F. 1978. Modern Fruit Science. Rutgers University.

Follett, R.H. and D.G. Westfall. 2004. Zinc and Iron Deficiencies, Colorado State University Extension Fact Sheet 0.545

Larsen, H.J., A.G. Gaus, R.J. Zimmerman, M. Rogoyski. 1998. Colorado Tree Fruits: Pest and Crop Management Guide. Colorado State University Extension bulletin XCM-41.

Stacey, J.K. 1972. Orchard Management Workshop Proceedings, Cedaredge High School

Westwood, M.N. 1978. Temperate-zone Pomology. W.H. Freeman and Company.

Additional fact sheets on fruit trees and their care include:

- 2.804, Backyard Orchard: Stone Fruits.
- 7.615, The Preparation of Small Spray Quantities of Pesticides.
- 5.507, Spider Mites.
- 5.519, Apple and Pear Insects.
- 5.560, Pear Slugs.
- 5.569, Insect Control: Horticultural Oils.

<sup>1</sup> C.E. Swift, Colorado State University Extension area agent, horticulture, Tri River Area, Grand Junction. 07/09.

**Table 3. Phosphorus needs based on the extraction method used.**

Phosphorus level of sufficiency ppm	AB-DTPA ppm	Bray-1 & Mehlich-II ppm	Mehlich-III ppm	Olsen ppm	Apply P <sub>2</sub> O <sub>5</sub> lbs/1000 <sub>2</sub> ft.
Very low to Low	0-7	0-12	<10	0-9	3.5
Medium	7.1-13	13-25	11-31	10-16	2.9
High	13-22	26-50	32-56	16-31	2.3
Sufficient	<23	>50.1	>56.1	>31.1	0

Note: The Phosphorus extraction method used may be noted on the soil test results. If not, contact the lab to determine what method was used.

**Table 4: Soil test results and recommendations.**

Potassium ppm	Apply K <sub>2</sub> O lbs/1000 <sub>2</sub> ft.	AB-DTPA extractable iron Fe ppm	Chelated Fe * (Sequestrene 138-Fe) lbs/1000 <sub>2</sub> ft
0-60	1.8	Low -2.0	3.5
61-20	0.9	Marginal 2.0-4.5	1.7
121-200	0	Marginal 2.0-4.5	0
201 +	0		

Note: Sequestrene 138 Fe is 6 percent iron. Other chelated iron products may not be effective in high pH soils.

## Placement of Fertilizer

Nitrogen (N) and other nutrients, with the exception of zinc, can be broadcast over the ground and watered in, or applied in a band in the irrigation furrows prior to irrigation. Do not apply fertilizer against the trunk as tissue damage may result. Spread the fertilizer evenly and do not dump it in a pile at the base of the tree or injury will result. If the area to be fertilized is more or less than 1,000 feet, calculate the amount of fertilizer to apply accordingly. Foliar applications can also be used if appropriate materials are chosen.