

Growing Apples and Pears in Minnesota

Leonard B. Hertz and Robert J. Mugaas
Horticulture

UNIVERSITY OF MINNESOTA
DOCUMENTS

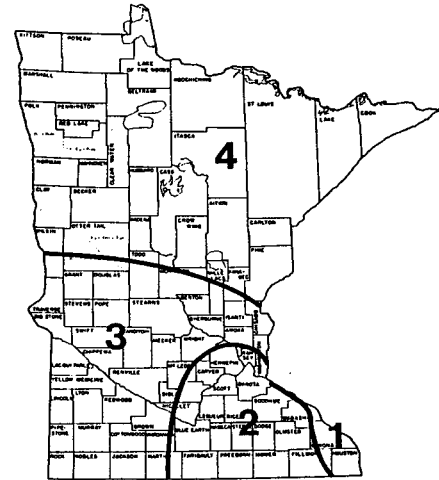
MAR 13 1991

ST. PAUL CAMPUS
LIBRARIES

The apple and pear, the most important temperate zone fruits, are grown extensively wherever climatic conditions are suitable. They are the oldest cultivated fruits. The wild ancestors of the apple are believed to have originated in the mountain regions between the Black and Caspian Seas, where there are large forests of apple trees exhibiting great variation in fruit characteristics. The pear originated in Europe and in North Africa, around the Mediterranean Sea. The early settlers brought seed to America and planted seedling orchards, generally in the northern half of the United States from the Atlantic Coast westward to the Mississippi Valley. From these seedling trees, hundreds of varieties suited to many regions of the country have been selected.

The fruit varieties listed in table 1 are recommended on the basis of suitability for the four fruit zones shown in figure 1. Suitability is based on hardiness, adaptability, and usefulness. A very hardy variety with poor quality may be recommended in a zone if varieties are not available that have better quality and sufficient hardiness.

In all zones, apples and pears should be planted only in favorable sites. This is particularly important in fruit zones 3 and 4. Do not plant apples and pears in the heavy, alkaline soils in the Red River Valley or in very sandy soils.



Minnesota Hardiness Zones

Figure 1. Minnesota fruit zones.

Table 1. Apple and pear varieties recommended for Minnesota fruit zones; varieties listed according to approximate time of harvest.

Fruit	Fruit zones ¹			
	1	2	3	4
Apples				
Early maturing				
Lodi			X	X
Oriole	X	X	X	X
Mantet ²	X	X	X	X
Hazen	X	X	X	X
State Fair	X	X	X	X
Beacon ²	X	X	X	X
Wealthy ²	X	X	X	X
Minjon			X	X
Chestnut	X	X	X	X
Red Baron	X	X	X	X
Lakeland ²	X	X	X	X
Mid season				
Sweet Sixteen	X	X	X	X
McIntosh	X	X		
Cortland	X	X	X	
Northwestern Greening	X	X	X	
Redwell	X	X	X	X
Prairie Spy ²	X	X	X	
Late maturing				
Honeygold ²	X	X		
Haralson	X	X	X	X
Red Delicious	X			
Regent	X			
Golden Delicious	X			
Connell Red	X	X	X	
Fireside	X	X	X	
Keepsake	X	X	X	
Pears				
Parker	X	X		
Pattern	X	X		
Luscious	T	T	T	

¹ X=recommended as suitable; T = suggested for trial.

² Has higher than average susceptibility to fire blight disease; see AG-FS-1159, Fire Blight.

Dwarf Apples

Dwarf apple trees are standard apple varieties grafted onto dwarfing rootstocks or grafted so that a dwarfing stem section (interstem) is inserted into the normal tree stem. In either case, small statured trees that produce fine quality fruit can be grown.

Most size-controlling rootstocks now used in this country have come from Europe. The East Malling Fruit Research Station, Kent, England, has done outstanding work in this field, developing a series of rootstocks that give different degrees of dwarfing for apple trees.

Cold tolerance is a special problem in Minnesota. Keep in mind that presently used dwarfing rootstocks will be injured if root zone temperatures drop to 18° to 22° F. Hardy seedling rootstocks can withstand temperatures as low as 14° F. without injury. It is advisable to mulch trees, at least for the winter. Use straw or hay and apply the mulch 6 to 8 inches deep from the trunk to the dripline (branched area) of the tree.

For more information on dwarf apple trees, see AG-FS-1109, Dwarf Apple Trees.

Planting

Plant trees in the early spring as soon as the soil can be worked. Make the hole large enough to accommodate the root system without bending the roots and deep enough so the graft union is at or about 1 inch above the ground line.

Container grown materials can be planted anytime during the growing season. Avoid planting during hot, dry, windy conditions.

When digging the hole, place the topsoil in a separate pile from the subsoil. Prune any broken or long, straggly roots. Then place the tree in position, with the first strong, wide-angled branch toward the southwest. Work some topsoil around the roots and lightly tap the soil to remove air pockets. Add a pail of water if the soil is dry. Finish filling the hole with a mixture of the remaining topsoil and subsoil.

Leave the surface 2-3 inches loose with a shallow depression around the tree to catch and hold water. Prune the young tree carefully, selecting strong, wide-angled branches to form the framework. These "scaffold" branches should be at least 6 inches apart, up and down the trunk.

Allow ample room for trees to develop without crowding (see table 2). Close planting results in upright trees that are difficult to spray and harvest.

Soil Management

Young trees have difficulty competing with weeds for water and nutrients. On level or nearly level ground, an area extending 3 feet in all directions from the trunk of the tree should be cultivated or mulched to eliminate weeds. As trees approach bearing age, a grass sod should be established. Bluegrass makes a good ground cover for mature trees.

In dry parts of the state, it may be advisable to continue cultivation in the mature orchard if new growth at branch tips is less than 8 inches. Where it is moist, however, it may be advisable to establish the sod earlier if terminal growth is extensive. Rapid, succulent growth is more subject to winter injury and fire blight.

On steep slopes, you can plant apple and pear trees successfully in sod. Keep an area around the base of the tree worked and add fertilizers as needed.

A straw mulch, if used, should be about 6 inches deep or deep enough to smother weeds. Replenish this mulch each fall.

Fertility

Use commercial fertilizers as needed. If growth is satisfactory and leaves appear to be vigorous and dark green, fertilizing offers no advantages. If, however, growth is slow and leaves are small and light green, fertilizers are beneficial. A complete fertilizer such as 1010-10 is a good choice for the home gardener. Some orchardists apply fertilizer in a broad ring starting about 3 feet from the trunk and extending beyond the branch tips. Others use a fertilizer spreader and cover the ground uniformly between trees. In the latter case, a heavy grass growth is encouraged over the entire area. Such growth can be both unsightly and unhealthy for a home lawn.

Another method for homeowners is illustrated in figure 2. Drill holes 2 feet apart with a soil auger in a series of parallel lines under the spread of the tree and extending past the branch tips (dripline). The holes should be 1 1/2-2 inches in diameter, 12-18 inches deep, and angled toward the tree. To prevent damage to the root collar, no hole should be within 3 feet of the trunk. Avoid damaging major roots when drilling.

Table 2. Planting distances, time intervals from planting to fruiting, approximate yields, and ripening dates

Fruit	Distance between rows	Distance between trees in rows	Time from planting to fruiting years	Approx. yield per tree bushels	Ripening period
	— feet —	—	years	bushels	
Apples (nondwarf)	25	25	4-10	5-10	Aug.-Oct.
Apples (dwarf)	20	15	2-3	2-4	Aug.-Oct.
Crabapples	25	25	3-7	5-10	Aug.-Oct.
Pears	30	30	5-10	4-6	Sept.-Oct.

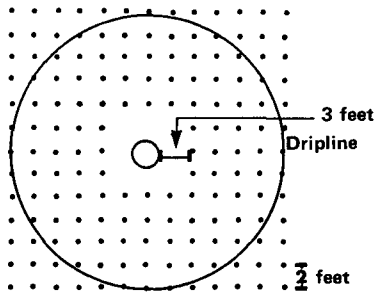


Figure 2. Drilling pattern for fertilizer applications.

The application rate varies with the size of the trees and the application method. A young tree, 2-3 years old, requires about 1 pound, whereas a mature tree might take 6-8 pounds of a complete 10-10-10 fertilizer. Divide the weight of the fertilizer by the number of holes to determine the amount to use per hole.

Place the recommended amount of fertilizer in each hole, add water, and fill holes with compost or peat. This method offers an added advantage because the holes help decrease soil compaction and increase air and water penetration. Holes also can be made with a punch bar, crowbar, or pipe, but removing the core of soil with an auger is more beneficial.

Using liquid injection root feeders is an acceptable method provided you maintain recommended application rates. This treatment may be less persistent than dry fertilizer and, of course, costs increase with the use of specialized equipment and fertilizers.

The best time to apply fertilizers is early in spring before growth starts. Late spring or summer applications may encourage late growth that may result in injury.

Pruning

Early spring, before growth starts, is the best time to prune your fruit trees. Pruning helps shape the young apple or pear tree and give it a strong framework. Pruning at planting time consists simply of removing all side branches except those selected for the permanent framework and heading back the selected branches. You have to prune during the second and third years to remove narrow crotches and select additional scaffold branches.

The ideal tree has a central leader and 6-8 well-spaced scaffold branches. These scaffold branches should come from the main trunk at a wide angle and be uniformly spaced around the trunk. If any side branches grow upward and overtake the leader, head them back.

Make all cuts as close to the trunk as possible to ensure rapid healing; use a sharp knife or pruning shears. When it becomes necessary to cut a branch back from the tip, always make a smooth cut beyond a side branch or lateral bud.

Remember, pruning is a dwarfing process. Continued heavy pruning of a young tree lengthens the time before the tree bears.

As the tree approaches maturity, a light pruning each year is beneficial. Remove any dead or diseased branches such as those showing fire blight cankers. Make the cuts as close to the main stem as possible. If the branch is large, first undercut to prevent tearing the bark when the branch falls. Paint large scars, 2 or more inches in diameter, with asphalt tree paint. Remove all water sprouts (fast growing upright branches) and branches that cross and rub.

Remove small branches near the center of the tree that have ceased to grow more than a few inches in length each year; they produce only small, poorly colored fruits. Little pruning should be necessary at the top and sides of the tree.

It is better to prune a little each year than to prune heavily at infrequent intervals. Severe pruning upsets a tree's balance. It also often results in production of an abnormal number of water sprouts, which may increase the danger of fire blight.

Complete heavy pruning by mid-April. You can remove water sprouts and weak branches during summer months. For additional information, see AG-MI-0556, Pruning Fruit Trees.

Thinning

Many varieties tend to be alternate bearing—they may set a heavy crop one year and produce very little or no crop the next.

Formation of fruit buds for the following year's crop begins a few weeks after flowering. A heavy crop of developing fruits at this time frequently prevents such bud formation. Consequently, early removal or thinning of the fruits during the "on" year will reduce the tendency toward alternate bearing. Thinning also results in larger and better colored fruits.

Hand thin after the June drop or about July 1. Where fruits are clustered, remove all but one fruit from each cluster. Space the fruits from 5 to 8 inches apart, removing the small insect- and disease-injured fruits first. Fruits can be spaced closer together on the outside and top of the tree than in the center, because such branches receive full sunlight. Thinning actually takes little time, and the improved yields and quality more than repay the expense.

Preventing Winter Injury

Cold temperatures may have harmful effects on apple and pear trees throughout Minnesota. By planting hardy varieties, you will reduce losses from winter injury.

Cold injury due to immaturity of wood (cold occurring before the tree has developed cold hardiness in the fall) usually results from conditions that cause trees to continue vigorous growth into the fall. Too much water, abnormally warm fall temperatures, and excessive amounts of nitrogen may cause excessive fall growth and predispose the tissues to cold injury. To reduce winter injury, keep trees moderately vigorous before winter arrives. Avoid practices such as late cultivation, excessive irrigation, and heavy or late applications of nitrogen fertilizers, which tend to stimulate fall growth.

Sunscauld, another type of injury, normally occurs in late winter on the south to southwest side of the main trunk and large branches. Bark, being brown or gray, absorbs the sun's rays in midafternoon and often warms up as much as 20 degrees above the surrounding air temperature. As a result, bright sunny days in later winter may activate the cambium and bark tissues on southwest trunk exposures. This reduces their cold resistance and may result in injury due to cold night temperatures. The bark then dries and splits; wood-rotting fungi enter and may seriously weaken or even kill the tree.

To protect a tree from sunscauld, wrap the trunk with strips of burlap or a tree "wrap" material. Painting the trunk with a white latex paint will reduce sunscauld since white paint lowers the temperature by reflecting the light.

A tree that is headed low and has a heavy growth of branches on the southwest side has some natural protection from the sun. Usually such a tree is damaged less by sunscauld.

Why Trees Fail to Bear

Failure of a fruit tree to produce fruit is a common and often perplexing problem. Of course, a tree must attain some size and age before it flowers and fruits. The time required varies with the kind of fruit, the variety, and the growing conditions.

Generally, pears take longer than apples and apples take longer than crabapples. The time interval between planting and fruiting may range from 10 years for some pear and apple trees to 1 or 2 years for some crabapples.

One common reason for failure to bear is lack of proper pollination. Apple and pear are self-sterile; apple must be cross-pollinated with another apple and pear with another pear. Some produce defective pollen, and others are incompatible with other varieties. Pollination may be insufficient if there is a lack of bees at time of bloom. If this happens, the trees fail to bear. To guard against a lack of good pollen, plant more than one variety of apple and pear.

Harvesting and Storing

Apples and pears are very perishable, so handle them with extreme care. If you plan to use summer apples for pies and sauce, you can harvest them before they reach full maturity. Generally, pick them when they are needed.

Harvest late maturing apples when they reach the proper stage of maturity: when they separate readily from the fruit spurs and before they drop. You may want to pick the tree several times in order to get all the fruit at the right stage of maturity.

Grasp the fruit and lift it up to "unhinge" the stem from the spur. Handle fruits carefully to avoid bruises and stem punctures.

To prevent shriveling, store apples at a constant low temperature and in a room with a high moisture content. Storing fruit in crocks, barrels, or plastic-film-lined containers helps reduce shriveling. The best storage temperature is near 34°F.

Pick pears a little on the green side and allow them to ripen in a cool basement. Such pears are juicier and have fewer gritty stone cells than do tree-ripened fruits. Pears do not keep for long periods, so eat or can them when they are ready.

Preventing Damage by Mice and Rabbits

Many young fruit trees are lost each year because of girdling by rabbits and mice. To prevent girdling, enclose the base of the trunk with a cylinder of 3/4-inch mesh hardware cloth. Make the cylinder at least 6-8 inches in diameter and extend it from about an inch below the soil level to the first branch. A less reliable protection from mice is to wrap the base of the trunk with heavy burlap.

These safeguards should successfully prevent mouse damage and reduce rabbit damage. When the snow is deep, however, rabbits can eat branch tips, so try to reduce the rabbit population. Leaving pruned branches on the ground also reduces damage to living trees; rabbits chew the bark from the branches and leave trees alone.

Dealing With Insects and Disease

Apples and pears suffer from about the same insect and disease pests. Growing clean fruit requires a careful program of sanitation and spraying. Since many insects and diseases overwinter on dead twigs and fallen leaves and fruits, a thorough fall cleanup greatly reduces infection the next year. Follow the spray schedule given in AG-MI-0675, Home Fruit Spray Guide.



Leonard B. Hertz is extension horticulturist and Robert J. Mugaas is Hennepin County extension agent, horticulture.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Patrick J. Borich, Dean and Director of Minnesota Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Minnesota Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, religion, color, sex, national origin, handicap, age, veteran status, or sexual orientation.