

St. Lawrence Nurseries
PLANTING GUIDE
Planting and Care of
Northern Climate Trees & Shrubs



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WHAT SHOULD I DO WHEN I RECEIVE MY PLANTS?

Are you 1, 2, or 3?

1) We received your order early and shipped it early:

If we received your Order before the end of March, and were able to ship it by mid-April, your trees were packaged when they were fully dormant, and shipped during cooler weather so that they did not overheat in transit. They can be planted right away if the ground is thawed; if not, hold them in a cool, dark place until planting time. (See page 4).

2) We received your order early, but held it for later shipping:

If you ordered early but requested that we hold shipment until late April or early May, your trees were packaged when they were dormant, but had to wait around until your requested shipping date. There is a greater chance that your package encountered hot weather in shipment, since things warm up as the days of April go by. Although it may be still cold where you are, this is not necessarily true for the cities through which your package had to travel. Even holding packages in our cooler until they are shipped cannot completely protect them from the effects of hot weather in shipment. Heat causes the trees to wake up and start growing before they are in the ground, a process that can rapidly deplete their root reserves. A bit of special attention can prevent this from compromising your trees' ability to grow vigorously once planted. Plant as soon as possible, use plenty of water, mulch generously, and follow up with daily watering after planting.

3) We received your order late in the season:

If we received your order in April (a postmark of mid-April is the deadline for Spring shipment,) your trees may be less dormant, because as the growing season approaches, they are starting to wake up; pushing out buds and little green leaves. (In fact, for early-blooming fruits like plums, cherries, apricots and currants, this leafing-out sometimes occurs even without late shipment). They are actively beginning to draw water and nutrients from the roots; although they might be “greener” when packaged, they are actually less able to bounce back after the stress of heat in shipment. Providing special care for your plant at this point can help it recover from the combined effects of heat during shipment and active growth. Plant immediately in good soil, first soaking the roots for several hours or overnight in a tub of water or manure tea. After planting, lay down a generous circle of good, deep organic matter mulch on the surface of the ground around each tree or plant. This will help conserve soil moisture around the roots. Water daily after planting until mid or late June.

WHEN TO PLANT

Trees and shrubs should be transplanted when they are dormant, *before* they begin to leaf out and grow. For Spring planting in most of Zones 3 to 5, this means early to mid April, when the water table is still high. This is not a very comfortable time for you, the planter; there may be some surface frost or lingering snow, but...

DON'T WAIT! SNOW OR FROST WILL NOT HURT A DORMANT TREE.

Here at St. Lawrence Nurseries, we often must plant in soil that has 1-2 inches of frost in the top layer. In spite of the cold, as soon as the roots are in the soil, root growth can take place; even in early Spring, before leaves begin to push out.

If you can get your plants in the ground early, while it is still wet and cold, they will reward you by establishing themselves more quickly.

WHAT DO I DO WITH MY PLANTS IF I CANNOT PLANT RIGHT AWAY?

Planting immediately upon arrival is **ideal**; however, if necessary, you can keep your shrubs and trees in good shape for a few days or even weeks by following the directions below:

1) Take off the outer white plastic wrapper. Inspect your plants to make sure that they are in good condition and your order was correctly filled. Look carefully! Smaller plants are often hidden down inside the inner root wrapper, or wrapped in newspaper to protect them.

2) Check the roots for moisture. See photo at top left opposite page. If the roots seem moist and you will be able to plant within a week, proceed to step 4. If the roots seem dry or if the inner wrapper is torn, take the plants out and soak the roots in a bucket of water or manure tea for several hours. Then you can either “heel in” the plants (see step 3) or repack the roots with damp (not wet) sawdust inside the root wrapper. Patch any holes in the plastic and tie up the root wrapping tightly to prevent the sawdust from drying out. Proceed to step 4.

3) Skip this step if your permanent location is ready! If you have a place in your garden that has thawed on the surface, it may be possible to “heel in” the trees to keep the roots moist until planting. This is a temporary measure to hold plants until they can be planted in their permanent spot. Thawed spots can sometimes be found under lingering snow cover or near a compost pile. You want the plants to stay dormant, so try to pick a place that is thawed but not overly warm or sunny. Dig a shallow depression. Remove the inner wrapper and lay the plants on their side with the roots in the depression. The plants can be loosely bundled together. Cover the roots fully with some loose, moist dirt.

4) If you decide to store your shrubs and trees until planting time, set the package in a cool, dark place like a cellar or garage. It should be protected from sunlight and extreme freezing temperatures until planting time. When you decide to plant, keep the roots in a bag or bucket, protected from wind and sun, right up to the moment of planting. Root hairs are very tiny and can dry out easily.

**DON'T WAIT UNTIL IT'S TIME TO PLANT YOUR VEGGIE GARDEN!
PLANT AS SOON AS THE GROUND IS THAWED!**

Open and inspect your package to make sure your order was correctly filled. Feel down inside the root wrapper for moisture.

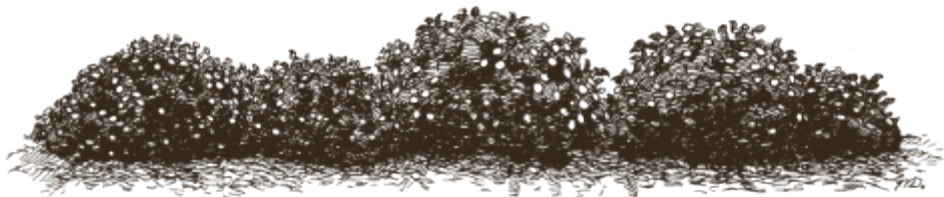


Plant early! Snow or frost will not hurt a dormant tree!



If you cannot plant right away, you might be able to “heel in” your plants. This is only a short-term holding strategy; the plants must be planted in their permanent place before they are in full leaf!

LANDSCAPING YOUR YARD USING TREES, SHRUBS AND EDIBLE ORNAMENTALS



Here are some general suggestions to follow as you begin to shape your ideal yard or garden spot:

Research the trees, shrubs, and plants you want to use in your landscaping scheme. What will be the height and spread of the plant at maturity? (See table on the next three pages.) Will it shade out anything else? Take direction into consideration and watch how the sun throws shadows over the course of a day. Don't put tall plants on the south side of smaller ones. Don't plant anything so close to a building that you can't get behind it when it is mature.

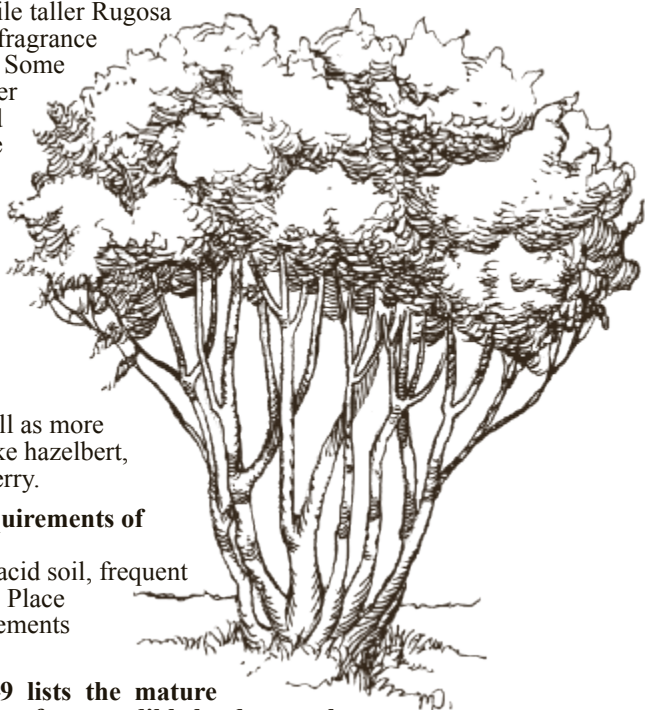
Mix species for diversity. This makes a more natural landscape that is less prone to diseases or pests and gives you greater variety in your garden. For instance, a tall tree might offer welcome shade under which to stretch a hammock on a hot day. Small flowering trees and shrubs such as seedling plums, pie cherries, and haskaps welcome spring with beautiful blossoms and provide nesting sites for birds. Bush cherries, currants, and juneberries, with their clusters of fruit, offer a treat to gardeners and wildlife. A low potentilla hedge gives a splash of yellow color bordering a walkway, while taller Rugosa roses provide beautiful fragrance throughout the summer. Some natives, such as red osier dogwood and honeylocust can be difficult to contain, so save them for areas where space is not at a premium.

For privacy and property line

delineation: there are the commonly used northern hedges such as highbush cranberry and lilac, as well as more unconventional hedges like hazelbert, juneberry, or Nanking cherry.

Research the special requirements of each plant in your landscape (for example: acid soil, frequent cultivation, full sun, etc.). Place plants with similar requirements adjacent to one another.

The table on pages 7-9 lists the mature height, spread, and shape of many edible landscape plants, fruit trees, and yard trees.



MATURE SIZE OF SOME LANDSCAPING PLANTS & TREES

SPECIES	HEIGHT	SPREAD	SHAPE
SMALL PLANTS: Under 1 foot.			
Lingonberry	12 inches	8-12 inches	Globular, ground hugging
Strawberry	12 inches	12-18 inches	Low growing, creeping
SMALL SHRUBS: 1 - 4 feet.			
Potentilla	2-3 feet	18 inches	Round, full
Red & White Currants, Gooseberries	3-4 feet	5 feet	Upright, rounded
Northblue, Northcountry, Superior; Blueberries	18 inches - 4 feet	3 feet	Upright, rounded
Ben Connan, Ben Lomond, Ben Sarek; Black Currants	3-4 feet	3 feet	Upright, compact
MEDIUM SHRUBS: 4 - 6 feet.			
Peking Cotoneaster	5 feet, unpruned	6 feet	Upright, rounded, dense, suckering
Consort, Titania; Black Currant	4 feet	5 feet	Upright, slightly nodding canes
Crandall Black Currant	4-5 feet	5 feet	Many irregular, arching stems
Chippewa, Patriot, Polaris, Northland; Blueberries	4-5 feet	4-6 feet	Upright, rounded
Blueray, Duke, Huron, Jersey, Nelson; Blueberries	5-6 feet	5-6 feet	Upright, rounded
Chokecherry	4-6 feet	4-5 feet	Upright; heavy suckering
Dwarf Ground Cherry	4-5 feet	4-5 feet	Upright, rounded, suckering
Jan, Joel, Joy; Bush Cherries	4-5 feet	4-5 feet	Upright, rounded, full
Red Osier Dogwood (Likes wet areas)	4-6 feet	5-6 feet	Upright, many-stemmed, forms thickets
Rugosa Rose (Salt tolerant)	5 feet	6 feet	Upright, suckers, forms dense, thorny hedge
Edible Honeysuckle	4-5 feet	8 feet	Rounded, very full, dense
Red Raspberry	4 feet	4 feet	Many canes, upright
Purple or Black Raspberry	6 feet	5-6 feet	Many canes, arching
Cherry Prinsepia	6 feet	6 feet	Forms impenetrable thorny hedge
Galicjanka, Nero, Viking; Aronias	5-8 feet	5 feet	Leggy, some suckers. Bare bottom 1/3

MATURE SIZE OF SOME LANDSCAPING PLANTS & TREES

SPECIES	HEIGHT	SPREAD	SHAPE
LARGE SHRUBS, SMALL TREES: 6 - 25 feet			
Nanking Cherry	6-10 feet	8-12 feet	Broad, open, spreading
Nannyberry	8-12 feet	8 feet	Vase shaped, open
Juneberries (<i>Amelanchier alnifolia</i>)	6-15 feet	5-15 feet	Open shrub or small tree
Lilac	8-10 feet	12 feet	Broad based, full top
Basket Willow, Corkscrew Willow	15-30 feet	8-12 feet	Many tall, flexible stems
Hazelberts <i>Photo on page 47</i>	8-15 feet	8-15 feet	Suckers heavily; many upright stems form vase
Highbush Cranberry	5-10 feet	8-10 feet	Vase shaped
Siberian Peashrub	10-12 feet	8-10 feet	Coarsely rounded, full
Winterberry (<i>Likes wet areas</i>)	8-12 feet	5-8 feet	Upright, open, rounded
Sea Buckthorn (<i>Salt tolerant</i>)	10-12 feet	6-8 feet	Crooked, thorns, many stems
Autumn Brilliance Juneberry <i>Amelanchier canadensis</i>	15-25 feet	10-15 feet	Multiple smooth, slender, gray trunks
Hawthorn	15 feet	15 feet	Small, thorny, broad spreading crown
Siberian Pear (<i>Prune minimally!</i>)	20-25 feet	20-35 feet	Beautiful pyramidal shape, strong sweeping branches
FRUIT TREES: 10 - 25 feet			
Grafted Apples, Wild Apples	10-30 feet	15-20 feet	Open, spreading, sturdy
Grafted Pears	20-30 feet	10-12 feet	Upright, columnar, sturdy
Dwarf Sour Cherries	8-12 feet	8-10 feet	Compact, rounded, short
Seedling Plums	10-12 feet	8-10 feet	Small, often 'Y' shaped
Grafted Plums	10-20 feet	10-20 feet	Small, often 'Y' shaped
Montmorency, Balaton Pie Cherries	15-20 feet	20-25 feet	Spreading crown

MATURE SIZE OF SOME LANDSCAPING PLANTS & TREES

SPECIES	HEIGHT	SPREAD	SHAPE
YARD & TIMBER TREES: 15 - 80+ ft.			
Mountain Ash	20-25 feet	4-12 feet	Slender branches, narrow crown
Northrup Mulberry	15-25 feet	20-40 feet	Upright, rounded, attractive
Black Walnut	60-90 feet	30-50 feet	Stately, upright tree; sweeping branches
Butternut, Buartnut	40-60 feet	25-50 feet	Upright; more squat & sprawling than Black Walnut
Bur Oak	15-80 feet	10-40 feet	Upright, straight; gnarled branches & corky bark
Red Oak	75+ feet	50-70 feet	Upright, stately; sturdy and spreading
Korean Nut Pine	30-50 feet	20-25 feet	Pyramidal; loose and feathery
Shagbark Hickory	60-80 feet	30-40 feet	Irregular, rounded crown; straight trunk, shaggy bark
American Chestnut	90 feet	30-40 feet	Stately, spreading, massive
Horse Chestnut	50-70 feet	40-50 feet	Oval, rounded form; spreading, impressive
Sugar Maple	70 + feet	50-60 feet	Oval, rounded; dense, spreading branches
Silver Maple (Fast growing)	70+ feet	50-60 feet	Similar to sugar maple, more spreading
Red Maple	40-70 feet	20-50 feet	Oval, rounded form. Weaker than sugar maple
Thornless Honeylocust	50-60 feet	40-60 feet	Upward/outward reaching branches, flat topped crown
White Ash	60-70 feet	40-60 feet	Very symmetrical branching habit; straight, solid trunk
Hackberry	20-25 feet	30-40 feet	Long, Spreading branches; cylindrical or 'Y' shaped
Black Cherry	50-60 feet	30 feet	Tall, straight trunk; cylindrical shape

CHOOSING A PLANTING SITE

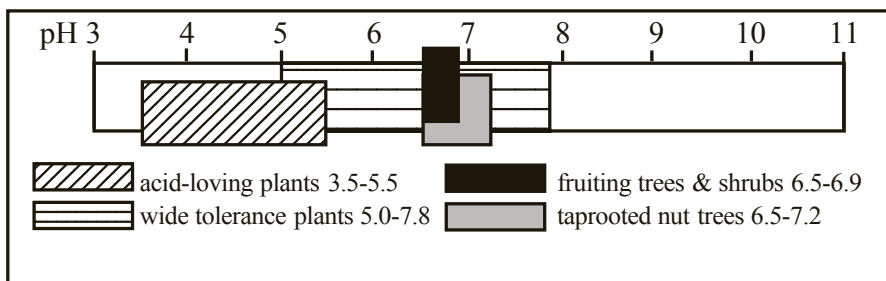
Location and Air Drainage. A sloping site facing southeast, south or southwest is ideal, but any slope will suffice if no southern exposure is available. Protection from north and west winds can prevent winter desiccation in drier western areas. For tender or frost-susceptible plants, try to provide a favorable microclimate. For example, planting a sour cherry in a courtyard surrounded by buildings on three sides, as opposed to standing alone in a field, will improve its chances of fruiting each year in a Zone 3/4 climate. Cold air is heavier than warm air, and tends to pour slowly downhill into gullies and valleys, piling up in low areas. Places where cold air collects are called “frost pockets,” and the growing season in such spots can be 2-3 weeks shorter than that on nearby slopes and hillsides. The term “good air drainage” refers to this slow downward movement of cold air, which favors the planting of fruit and nut trees on higher ground.

Soils: Acidity, Structure, Drainage. The bar graph to the right illustrates the range of soil pH, which is a measure of acidity. Acid or “sour” soils have a pH below 7.0; basic or “sweet” soils have a pH above 7.0. Most fruiting trees and shrubs will grow best on deep well-drained loam soils with a pH of 6.5 - 6.9. Blueberries and lingonberries need a much more acid soil: pH 4.2 - 5.5.

Use a test kit to determine the pH of your soil. The test should be accurate enough to tell you the soil pH to the closest tenth (one number to the right of the decimal point.) Kits can be obtained from your local Cooperative Extension or Soil Conservation Service, or see sources pp. 46-47. If your soil is 7.5 pH or higher, you will have a hard time growing blueberries, lingonberries or other acid-loving plants. Soil can be made more acid (its pH lowered) by mulching with pine needles, peat moss, or other acid mulches (see Blueberries) and/or by applying sulfur. Sulfur comes pelletized or as a powder, and is pure sulfur, sometimes called “flowers of sulfur.” Do not use aluminum sulfate; aluminum can become toxic to plants in an acid environment. To “sweeten” soil, or make it more basic (raise the pH), lime or wood ashes can be applied. Agricultural lime (calcium carbonate or dolomitic limestone) can be found in ground or pelletized form at garden stores, or in bulk at nearby paving quarries, where it is much cheaper than the bagged lime in stores. You should not use hydrated, or “hot” lime. Don't try to shift your pH more than one full point (for example, from 6.4 to 5.4 or the reverse) at one time. If you are preparing your soil before planting, application rates for sulfur and lime can be obtained from your local Cooperative Extension, or consult the table on the next page. Ideally, you should try to incorporate sulfur the year before planting, especially if you are trying to lower the pH in heavier soils. Pre-plant application rates are calculated according to your present soil pH, and given in lbs. per hundred square feet or per acre. You can adjust the recommendations to the square footage you plan to treat. The recommended amount can be spread over the whole area and then lightly incorporated into the top 6 inches of the soil. Sulfur is oxidized by soil bacteria into sulfuric acid, which in turn breaks down into sulfates and free hydrogen ions. This bacterial action depends upon temperature, moisture and duration; the full effect will not be realized for several months. Soils containing a lot of free lime (like those which are underlain by limestone) may neutralize added acid so quickly that it is worthwhile replacing all the soil in the root zone of the plant with acid surface soil from a nearby pinewoods (the layer of decomposed “duff” under the pine needles is particularly good,) or you can incorporate a handful of *ground* peat into the soil around each acid-loving plant. If you are applying sulfur or lime after plants are already planted, you can mix it with the material used to mulch your plants or trees. Sulfur can burn plants if in direct contact with stem or roots, so if you are applying it after plants are already established, use only 1 tablespoon of plain sulfur mixed into the mulch covering a 4 ft. square area around the plant. Alternatively, if your soil is acid and you want to apply lime after trees have been planted, (in some areas this can be necessary almost yearly,) two shovelfuls of agricultural lime mixed into the mulch for one tree, or spread around at the base of the tree, is about right.

Apples, pears, plums, cherries, and hazelberts, blueberries, and lingonberries do not like clay soil. However, black walnuts, butternuts, buartnuts, hickories, and oaks and will do fine in clay if there is moderately good water drainage. The pH for these taprooted nut trees should be 6.5-7.2. Although nut trees have a reputation for slow growth, they can grow vigorously when planted on deep, well-drained loam or well-drained rich clay, outstripping even fast growers such as white pine. Likewise for the Sweet Sap Silver maple; they prefer a pH of 5.0-7.0.

Stony soils are more of a problem for the planter than for the tree, but no tree will do well in soil where bedrock is close to the surface. Heavy clays, poorly drained swampy sites, and excessively drained sand soils also are restrictive to plant growth and health.



Preplant Application To Raise Soil pH to 6.5:

Lbs. of Ground Limestone
per 100 sq. ft.--
Incorporate into upper 6" of soil

Start pH	Sandy	Loamy	Clayey
4.5	12.6	25.3	34.8
4.6	12.4	24.8	34.1
4.7	12.0	24.1	33.1
4.8	11.7	23.4	32.2
4.9	11.2	22.3	30.7
5.0	10.6	21.1	29.0
5.1	9.9	19.8	27.2
5.2	8.9	17.7	24.3
5.3	7.2	14.3	19.7
5.4	5.3	10.7	14.6
5.5	4.2	8.4	11.6
5.6	3.6	7.2	9.8
5.7	3.1	6.2	8.6
5.8	2.6	6.1	7.1
5.9	2.0	4.0	5.6
6.0	1.7	3.3	4.5

Preplant Application To Lower Soil pH:

Lbs. of elemental sulfur
per 100 sq. ft.--
Incorporate into upper 6" of soil

Note: Heavy clay soils are not appropriate
for acid-loving plants.

Start pH	End pH	Sandy	Loamy	Clayey
8.0	7.0	1.2	2.4	3.3
8.0	6.5	1.7	3.4	4.7
7.5	7.0	.5	1.0	1.4
7.5	6.5	1.0	2.0	2.7
7.5	6.0	1.5	3.1	4.2
7.0	6.5	.5	1.0	1.4
7.0	5.5	1.9	3.7	5.1
6.5	6.0	.5	1.1	1.5
6.5	5.5	1.4	2.7	3.7

*Thanks to Steve Vandermark and
the Canton, NY Cornell Cooperative Extension
for help with this page.*

PLANTING YOUR TREE



How deep to plant fruit trees (STANDARD): When planting standard sized fruit trees like ours, it's best to encourage them to become at least partially "own-rooted," that is, to promote rooting *above* the graft union. To accomplish this, you must plant grafted apples, pears, plums an inch or two deeper than they were in the nursery...this will place the graft union (near the root collar) *below* the ground. Don't worry if you can't see the graft! Simply find where you think the soil level was before, and plant the tree an inch or two deeper than that level. What was formerly the above-ground portion (the scion, above the graft) will sprout new roots just under the surface of the soil, and these roots will arise from the actual cultivar (for instance, McIntosh or Northern Spy,) rather than from the rootstock onto which it was grafted. If the tree is ever damaged and then sends up sprouts from the base, these will likely be growing from above the graft rather than from the rootstock, and will make a new tree of the same variety.

How deep to plant fruit trees (SEMI-DWARF): As our climate continues to shift, we've made the decision to add a few semi-dwarf apples to our regular standard offerings. Standard sized fruit trees will remain the backbone of our operation! With that said, in an effort to adapt to our new climate reality, we grafted a few of our more tender varieties onto a semi-dwarf rootstock from Cornell; Geneva 969. These trees will top out at approximately 75% of the size of our standard trees on Antonovka; again here it is easy to keep them smaller with pruning. They will thrive in a zone 4b or milder, but are not recommended for zone 4a or lower! When planting trees on dwarf or semi-dwarf stock, it is important that the graft union remains *above* the soil line. For the same reason that we recommend planting semi-dwarf trees with the graft an inch or two below the soil, it is crucial for the union on these semi-dwarves to remain 1-2 inches *above* the soil line when planting. If the scion (the grafted variety on top) is allowed to set its own roots, the dwarfing influence of the rootstock will be eliminated, or greatly reduced, and you will end up with a full-sized tree.

Only our apples, pears and plums will have a graft union.

Plant standard sized grafted fruit trees 1-2 inches *deeper* than they were in the nursery, with the graft level below the surface to encourage "own-rooting."

The opposite is true for apple trees grafted on semi-dwarf rootstock; the graft level should be 1-2 inches above the surface to *avoid* "own-rooting."

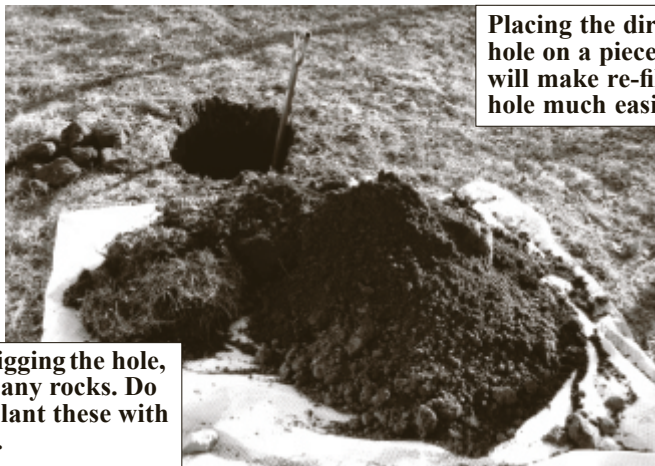
Digging the hole. We recommend digging your holes by hand. A square-ended spade shovel works better than a round-point shovel. Keep the trees in the shade while you are digging. The roots should remain wrapped, or you can soak them in water or manure “tea” for an hour or so before planting. Do not allow the roots to be exposed to wind or sunlight, even for a short time. Using the shovel, cut a hole in the sod 2-4 feet in diameter. Skim off the sod, and pile it on the edge of the hole. Next remove the topsoil and place it in a second pile. When you hit sub-soil, use it to form a third pile. These piles will go back into the hole in reverse order. A work-saving idea is to pile the dirt from the hole on an old feed bag or piece of plastic rather than in the grass next to the hole; it makes re-filling the hole much easier. Dig until your hole is about 1 1/2 to 2 feet deep. It’s best

if the hole goes straight down on the sides. This gives a much larger volume than tapered holes. You may make narrower, deeper holes for long-taprooted nut trees. Do not cut taproots and do not curl them around in shallow holes. In clay soils the shovel will often make a compressed, “shiny” side as it slides down through the soil. These smooth sides can act as a sort of vertical “pan” which is difficult for young roots to penetrate. It can be eliminated by “roughening” the sides of the hole with the shovel.

**“A \$5 tree in a \$10 hole =
A \$50 end product.”
Fred Ashworth**



Placing the dirt from the hole on a piece of plastic will make re-filling the hole much easier.



When digging the hole, remove any rocks. Do not re-plant these with the tree.

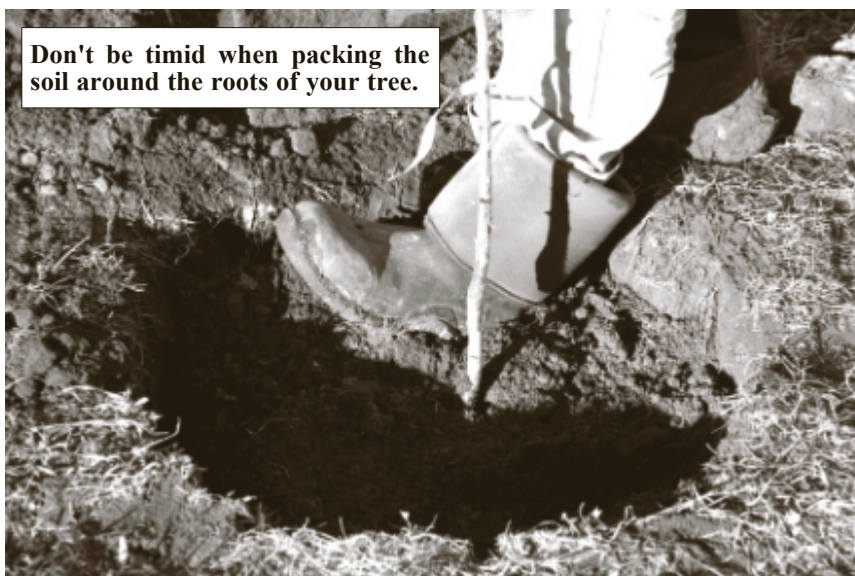
Setting the tree and filling the hole. Hold the tree in the hole at the depth you want it to be. Keep in mind that when you are done you will want the tree to be at about ground level in the middle of a “saucer,” so that water runs toward it, rather than sitting on a “hill” where water runs away. For this reason, always dig deeper than you think you’ll need to. Using the edge of the shovel, chop up the sod and press it, grass portion down, into the bottom of the hole. As the sod decomposes, it will provide nutrients for the establishing tree. As you fill in around your tree, you are going to reverse the soil layers, putting the topsoil at the root level and the subsoil on top, where it can slowly be improved by nutrients from manure, compost, fertilizer and

lime that you apply as mulch. (See *Mulching*, p. 16.) If the tree has a fibrous root system, center the roots on top of a little mound of topsoil in the hole, then cover them with more topsoil. For taprooted trees, simply hold the tree upright and fill in around the root with topsoil. Before you add more dirt, pack the soil firmly around the root, gently moving the tree back and forth, compressing the soil all around the stem with your heel or toe to exclude large air pockets.



Make sure that your hole is deep enough. The tree should end up sitting at the bottom of a slight saucer-like depression.

Don't be timid when packing the soil around the roots of your tree.



Fill the hole about halfway, then add 2 to 3 gallons of water. This amount of water will temporarily make the soil in the hole very mucky and “jello-like.” Eventually, as the water is fully absorbed by the ground, the soil will be sucked in close around the roots, minimizing air spaces. After packing and watering around the root, fill the hole to the top with the remainder of the soil, using up the topsoil first and then the subsoil. Shape the top layer in a “dish” shape that is thickest at the out side edge and thinnest at the center. Fill this “dish” with another 2-3 gallons of water, again giving it a mucky, jello consistency.



Add 2-3 gallons of water when the hole is half-filled with soil.



The only thing that should go back into the hole is good soil. No peat moss! Peat moss is too acid for most plants and tends to foster air pockets in the root zone. (How many fruit trees have you seen growing in a peat bog?) Likewise, compost and mulch should be laid on top of the ground, not mixed with the soil in the hole. If the soil from the hole is extremely poor, either choose another site with better soil, or import good topsoil (you can “borrow” some from your garden if you have one) to use in the hole. In this case, make the hole even larger, especially width-wise, so that the roots will continue to have access to the imported soil as they grow and spread out.

MULCHING



Once the tree is planted and watered, it should be mulched. Mulching is covering the ground with a protective layer of organic matter, which will smother weeds and prevent evaporation while allowing water and nutrients to soak through. A good deep mulch can make the difference between survival and failure. It can be accomplished with aged manure, wood chips, shavings, sawdust, compost—any material which can be laid down thickly enough to smother weeds and will eventually rot down. Do not use rocks or decorative gravel as a “mulch” around the base of the tree. These will conduct cold to the roots in winter, especially when there is no snow cover, causing root injury. Fill a large wheelbarrow with your mulch and dump it at the base of the tree. Then, starting at the trunk and working outward, form a dish that enlarges the one you made in the soil when you planted the tree. The dish should be

thinnest (about 1 inch thick) in the middle, where the mulch comes into direct contact with the trunk, and thickest (6–8 inches) at the outside rim. This dish shape will ensure that water will run toward the tree instead of off into the field. Lime, bone meal, or rock phosphate may be added to the mulch beforehand or sprinkled on afterward. To smother weeds or grass, lay flat sections of half-inch thick newspaper under the area where your circle of mulch will be. Spread your layer of manure or other mulch on top of this. The paper will smother weeds for about a year, but will still allow water and nutrients to trickle down through to the soil.

STAKING

When properly planted, a 3-5 foot tree should need no additional support. However, putting a marker stake by each tree will make it less likely to be broken off by snowmobiles, plows, lawn mowers, and tractors. (When planting large trees, staking is necessary, because the wind will continually “work” the tree back and forth, preventing the growth of vital root hairs).



Marker stakes lessen the possibility of “Oops!” damage from mowers, tractors, etc.

WATERING

This is undoubtedly the most important aspect of establishing any new tree or shrub. After planting, follow-up watering is a must. We recommend 5–10 gallons of water per tree regularly (regularly might mean daily, three times a week, or a good soaking every weekend) for the entire first growing season, especially during the dry months of late July through mid-September. Rain in the forecast does not excuse you from your watering chores. Rain is spread out evenly over the surface of the ground and cannot equal the effect of a good, long drink from a 5-gallon bucket or hose. Rather than using the weather to judge watering needs, dig under the mulch to feel the soil. If it is dry or slightly moist, water. If it feels waterlogged, then pass for a few days. If it is physically impossible to water the tree every day, aim for two to three times per week, or at the very least, on weekends. Ninety percent of all tree failures in the first season are caused by lack of water. Sometimes, even when enough water is present in the soil, the roots of the plant may not be able to absorb it efficiently. If soils are sandy, most of the water will pass right by the tree's roots as it drains quickly away. Failure to pack the soil well around the roots



during planting can cause air pockets, isolating roots from the matrix of soil that allows them to absorb water, and they can dry out in spite of adequate watering. If a heavy clay soil is allowed to dry out, it can crack and shrink away from the roots of the tree, leaving them “high and dry” even when watering resumes. The root systems of trees planted late in the season (late April, early May) may be slow to become fully established, making it harder for them to absorb water at first. One of the most valuable aspects of mulch is its ability to hold soil moisture, so it is good to

mulch a large area around the tree. It is possible to drown a tree, but this is usually due to poor site selection (wet, swampy areas, or heavy clay). The symptoms of too much water, curiously enough, are the same as those for not enough water: browning and loss of leaves.

FERTILIZATION

Fertilize Before July 1. Young trees should be fertilized sparingly, using natural fertilizers. A good manure mulch is usually sufficient. If your soil tests low or medium on calcium, you can add gypsum to the mulch. Natural foliar feeds (seaweed, unpasteurized liquid fish) are a good way to supply nutrients. These are sprayed on and assimilated through the leaves of the plant. Some provide N/P/K; others mostly micronutrients or natural growth enhancers.

Most fruit trees “set” their terminal buds by mid-July, and from then on the tree begins to prepare for the following winter. Fertilization or foliar feeding after this time may delay the initiation of “hardening off” that is so critical to the plant's survival over the coming winter, leaving it vulnerable to winter injury. For this reason, fertilize or foliar feed only before July 1, or, in very cold areas, June 15.

SCREENING

Trees should be protected from mice, rabbits, deer, and moose. For mice and rabbits, 1/4 or 1/2-inch mesh hardware “cloth” (close-knit wire fencing) works best; it should be rolled around a pipe to make it hold a curved shape and then hooked together in two or three places to form a mini-cage around the tree trunk. This cage will generally be a diameter of 4–6 inches for a newly planted tree. It should be replaced with a larger cage once the trunk has expanded. (The cage should not be tight to the trunk.) A cage about 1 1/2 to 2 ft. high should be sufficient to protect against the worst mouse and rabbit damage. **Precut hardware-cloth screens are available through our catalog or website.** Household window screen, wrapped closely around the stem all the way down to the base, will discourage tree borers, and some growers claim that it is also effective against mice and rabbit damage. Our favorite protection is a hardware cloth cage wrapped with window screen that is tucked in at the top. A word of caution about the white spiral plastic tree “guards.” Although they seem easy and convenient at first glance, these have several disadvantages over hardware cloth. First, contrary to their claims, they do not expand as the tree grows. If allowed to remain in place season after season they can become embedded in the bark of the tree, pulling tightly against the trunk and preventing air circulation between the bark and the plastic. This leads to sweating and massive tree injury during growth periods. Wrapping the trunk with tape can cause the same problem — moisture buildup followed by rot and insects when warm weather comes. If you choose to use plastic spirals or wrapping tape, put them on late in the fall and remove them in early spring. To prevent deer or moose browsing, you should fence off the orchard (a ten foot fence should do it!) or build a pen around each tree at least 5 ft high, and wide enough to prevent browsers from reaching their necks over to take a bite. (See photo opposite page).



We do not recommend plastic “tree tubes! They tend to promote winter injury.



Be sure to loosen strings and readjust window screen each season. Do not allow it to bind or “grow in” to the trunk.

Painting tree trunks each year with white, interior latex paint (not oil-based!) can prevent sunscald and makes borer detection easier. Mix your paint at a 1:3 paint to water ratio.



Above right: A pen can be constructed around each of your newly-planted trees to prevent unwanted “pruning” by deer or moose.

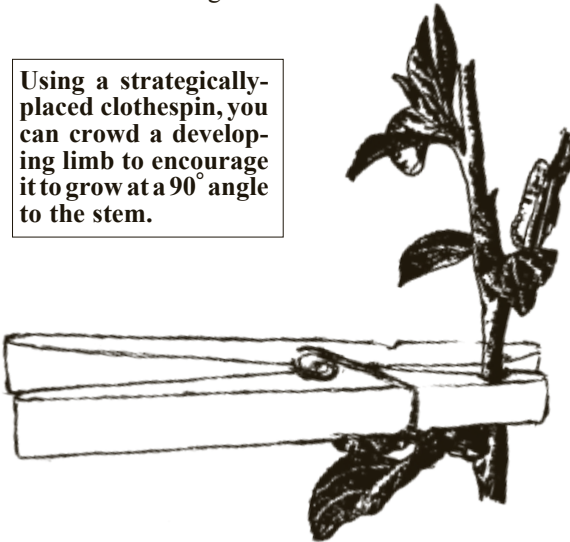
A free-standing deer fence that can be lifted off for mowing uses 6 x 6 inch concrete reinforcement wire mesh, available in 5 X 10 ft sheets, to make a 5 ft high cage.

PRUNING

If there are broken limbs or roots on your tree when it arrives, they may be cut off squarely. Other than this, newly planted trees require little or no pruning the first year. How much pruning should be done after the first year? This depends on the type of tree and its particular growth traits. Taprooted nut trees should become well-established and begin to grow strongly before they are pruned at all, and even then pruning should be confined to removing some of the lower branches as the tree gets taller. This will increase the length and quality of the “butt log” (the straight portion of the trunk that is prime for lumber). On the other hand, hazelberts grow as a bush, and pruning off some of the top can encourage them to produce numerous stems.

Apple Pruning and Training. Of all trees, apples probably require the most frequent pruning to maintain shape and good fruit production. Heavy pruning, however, will not be required until the tree has been established and growing for several years. There should be no pruning at all the first year except to cut off broken or dead twigs. You can, however, “train” your one- or two-year whip to develop a desirable branching habit. Branches that grow straight out from the trunk at 90° (“L”-shaped) are the strongest. “V”-shaped crotches are weak and less likely to support the weight of the branch in a storm or under a heavy fruit load. Watch for new little buds that are just beginning to develop along the trunk. While these are still green and flexible, train them to grow out from the trunk at a 90° angle by fastening a clothespin above them. The bud will begin to grow upward, hit the clothespin, and instead will grow straight out. (See illustration below.) Once the apple tree has branched out nicely, select three or four strong, 90° branches that you will allow to develop into a scaffold. These will become the fruit-bearing structure of the adult tree. They should not be set too low on the trunk and should ideally point outward in opposing directions. Prune off branches that do not contribute to this chosen pattern. You can keep your scaffold limbs growing at 90 degrees to the trunk by hanging weights, such as partially water-filled plastic jugs, from them, and/or by using limb spreaders. This is a process that will continue over several years and, by the time it is complete, the tree should be fruiting. After the scaffold is well established, the tree should be pruned each year to remove undesired growth.

Using a strategically-placed clothespin, you can crowd a developing limb to encourage it to grow at a 90° angle to the stem.

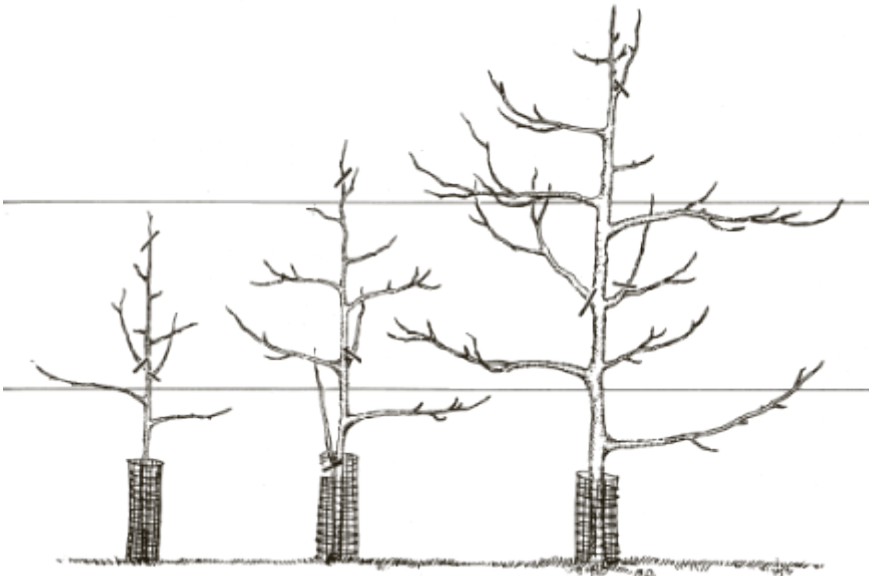


Basic Checklist for Pruning Fruit Trees:

1. Remove all dead wood.
2. Make all pruning cuts clean and neat. Cut along the ridge of tissue which separates branch collar from limb. Avoid flush cuts that leave the trunk "bumpless!" You should be able to see a *small* bump where you cut off the branch.
3. DO NOT COAT PRUNING CUTS WITH ANY KIND OF COATING!
4. Know when to stop cutting; be judicious, not drastic. Keep the tree's natural shape, with branches and trunk balanced.
5. (For Apples). Prevent crossing branches by removing one of them.
6. For Apples). To keep a tree small, prune away mostly the upward-growing wood, leaving downward and outward-growing branches or buds.

Pruning is more of an art than a science, and experience is the best teacher!

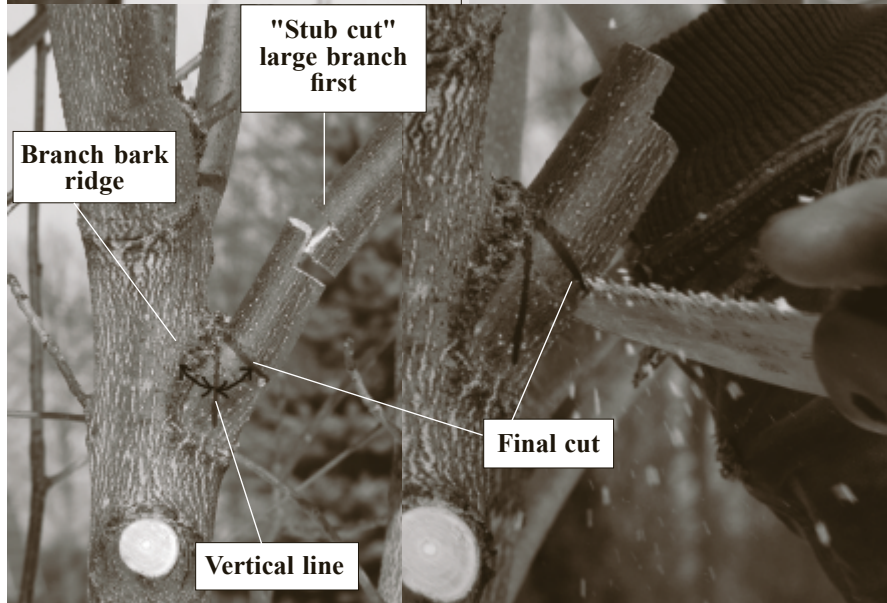
When to prune: Most of your pruning should be done at the end of winter (in late March or early April for Zones 3-5). After the most bitter weather but before the tree has broken dormancy. However, some summer pruning can be done on branches just getting started; if you see one emerging in an unwanted place on the trunk, rub or trim it off. Root sprouts, which are straight stems that push up out of the ground near the base of the tree, and "water spouts," the short twigs that grow straight up from the top branches of apple trees, can also be summer-pruned without harm to the tree.



A sequence showing good scaffold development.

An unpruned apple tree on Antonovka rootstock (photo below) will reach 15-20 feet in our climate. If pruned (right,) it can easily be kept at a manageable 10-12 feet.





Avoid cutting flush to the stem. Look for the “branch bark ridge” (sometimes a circular wrinkle) where a branch emerges, and cut just beyond it. The angle from vertical to the final cut should roughly mirror the angle of the branch bark ridge.

THE HOME ORCHARD

An orchard is a convenient grouping of trees, which can be all of one species, or include several. Our own home fruit orchard includes apples, pears, plums, pie cherries, and cherry-plums on a slope of sandy loam. We also maintain a plantation of young black walnuts in a different location, a flat piece with more clayey soils. Soils are a prime consideration in establishing your orchard. Deep well-drained loams with a pH of 6.5-6.8 are the best for fruit trees. Avoid shallow soils (depth to bedrock 8-36 inches), and light sands with a high percolation rate. Soils with very slow percolation rates, like heavy clay or waterlogged ground, are not good sites for your orchard. Cold air flows slowly downhill, piling up in the low places or "frost pockets." Therefore, your fruit orchard should be strategically placed on high ground or on a hillside where the cold air will flow past it. In the far north, the best sites are often open slopes to the southeast, south or southwest (although the latter choice might increase chances of sunscald or "southwest injury", a form of winter damage.) However, the top or middle of a hill in any direction is better than planting at the bottom of one. Our own fruit orchard happens to be on a west-facing slope. Favorable microclimatic conditions might include proximity to a large body of water such as a river or lake, the presence of a natural windbreak to the north, such as a woodlot, or the presence of one or more large buildings which can provide shelter from winds and give off some heat. Judge your land critically. Does existing vegetation thrive or barely survive? If climatic or soil conditions are too harsh for native bushes and trees, it is unlikely that fruit or nut trees will thrive. If the only site available for your orchard does not meet all of the ideal conditions, don't despair. There are things you can do to improve the site, especially if you start thinking about your orchard a few years in advance of planting the trees. One of the most important tenets of "holistic orcharding" is to support the beneficial mycorrhizae (fungi) that will ultimately play a large part in helping your trees fight off disease. Spreading manure, compost, old hay or any organic material will improve the fertility and water-holding capacity of the soil. Even mowing the grass and weeds two or three times during the summer and letting them "compost" naturally will increase soil fertility and encourage beneficial microorganisms in the surface layers of the soil. "Haphazard mulching," that is, leaving piles of aging leaves, wood chips (especially from small branches less than 1 inch in diameter,) old hay or straw, aged manure, etc., around the orchard site, will help support what Michael Phillips (author of *The Apple Grower; A Guide for the Organic Orchardist*) calls "the fungal curve." If the future orchard site is very uneven, you may want to plow and plant it with a grass/legume mix. But remember, any time the soil is tilled, the natural cycle of beneficial microorganisms is temporarily interrupted. Do the best that you can within the limits of your available time, money and equipment.

Spacing. An orchard may be any size you wish, from 5 to 500 trees. Fruiting trees need lots of sunlight to ripen their fruit, and this should be the primary consideration when deciding how far apart to place the trees. Air circulation is also important, since many common diseases are exacerbated by moisture and lack of air movement. Trees in a single row with open fields on each side may be planted closer together than trees in multiple rows. This is because the branches of the trees in the single row can stretch out further sideways for their light requirements, while the branches of trees in multiple rows are limited by the presence of their "next door neighbors." Another spacing consideration is your climate. If you are in the far north, your trees will be smaller at maturity than they would have been if grown in a warmer zone. Hence a Zone 3 grower might space her standard apple trees 25 feet apart, while a 35 foot spacing would be required in Zone 6. Altitude has a similar effect on the overall size of trees. Two lone standard size fruit trees in a backyard might be planted as close as 15 feet if they are in a cold climate. Minimum orchard spacing between most fruit and nut trees is 20 feet; maximum 40 feet.

Orchard patterns. The simplest orchard pattern is the square: rows of trees in which the distance between each row is the same as the distance between each tree. The advantage of the square is that tractors and equipment can be run horizontally or longitudinally throughout the orchard. The disadvantage is the “dead” space between 4 trees, which, in orchards with wide spacing distances, can represent a large amount of the total orchard area. A more space-efficient pattern is the quincunx, which consists of rows planted in a staggered “bricklayers” arrangement. Tree “1” in row B is midway between trees “1” and “2” in row A, etc. The square and the quincunx represent only two types of the many patterns available. When laying out your orchard, keep in mind the probable movement patterns of tractors, wagons, spray equipment, etc. Will you use irrigation? How will the water be delivered to the orchard? Planning ahead will help you to use the natural topography of your land wisely. If you plan to use straight rows, keep each tree dead straight in the row! It’s difficult to mow an orchard when even one tree is 6-12” out of line. All too often, young trees that are out of line get squashed by a tractor tire during routine maintenance operations.

Mowing. You want to be able to walk around among your trees without bush-whacking, but don’t be a mow-aholic. Long grasses provide good habitat for beneficial insects. These beneficials help control pests that might otherwise plague your orchard, so don’t mow away their habitat. Leave some “wild areas” and strips of long grass. Ideally, mow these strips only twice a year; in July and just before harvest.

A YEAR IN THE ORCHARD

JANUARY 1. Read a book on pruning. 2. Pack snow down around hardware cloth mouse/rabbit guards.	JULY 1. Light summer pruning. 2. Pick up drop apples. 3. Harvest pie cherries. 4. Mow orchard toward end of month.
FEBRUARY 1. Pack snow around guards. 2. Begin pruning last week of the month. 3. Spread wood ashes around trees.	AUGUST 1. Loosen and reset hardware-cloth cages 2. Check for borer entry holes on trunk. 3. Harvest early apples, early pears & plums. 4. Remove and clean apple maggot traps (red spheres).
MARCH 1. Continue pruning. 2. Remove tent caterpillar egg cases.	SEPTEMBER 1. Continue harvest. 2. Paint trunks for sunscald protection with white <i>interior latex</i> paint 3. Keep drops picked up. 4. Continue to watch for borers. 5. Monitor mouse and rabbit population.
APRIL 1. Finish pruning before green-tip stage. 2. Brush hog or burn prunings. 3. Apply dormant oil. 4. At first green of bud tips, use sulfur scab spray. There should be 10-14 days between oil and sulfur sprays. 5. Pick off any tent caterpillar nests.	OCTOBER 1. Final orchard mowing. 2. Finish harvest and pick up all drops. 3. Mow or rake leaves if practical (to limit spores of scab overwintering). 4. Clean and winterize sprayer.
MAY 1. Apples bloom around the 12 th -17 th in Zone 3. 2. Spray foliar feed. 3. First application of <i>Surround</i> at full bloom. 4. Repeat <i>Surround</i> at 5-7 day intervals for 4-6 weeks; 6 to 8 sprays. 5. Scab sprays continue if indicated.	NOVEMBER 1. Make sure all trees are painted with white <i>interior latex</i> paint and all mouse/rabbit guards in place. 2. Check deer protection (fence). 3. Spread lime if needed.
JUNE 1. Continue <i>Surround</i> . Add BT or Entrust for Codling moth control. 2. Hang apple maggot traps (red spheres). 3. Thin apples when ~1 ½ inch diameter.	DECEMBER Take a break!

SPRAYING AND INSECT CONTROL

An Herbal Approach to Orchard Health. Michael Phillips, in his book *The Apple Grower: A Guide for the Organic Orchardist*, as well as on his website (<https://holisticorchardnetwork.org>), advocates the use of natural plant extracts to boost soil health and support mycorrhizae. Central to his “holistic orchard” program is pure neem oil, which is delivered by spray to the trees from right after bud break throughout the summer. He also promotes liquid fish, an unpasteurized foliar spray that is different than fish emulsion, as well as haphazard mulching, ramial wood chips, compost tea, and other health builders for the orchard. The idea is to build a healthy tree immune system that can deflect insects and disease with a minimum of chemical inputs. However, there are times when insect or disease pressure requires a response from the grower that addresses the problem without too much harm to soil, plants, or beneficial organisms. What follows is a general summary of some of the more commonly used natural and organic remedies. **Dormant Oil:** There are many tiny critters that hide in bark crevices over the winter and will wake up in spring and start chewing on your tree. A good natural “dormant oil” spray, with no pesticides or fungicides added, works effectively to smother overwintering egg cases and insects, and is a preventive measure recommended annually for all fruit trees. It kills pear leaf blister mite, scale, and pear psylla. Dormant oil, as the name implies, should be applied in late winter (February through April) before bud break. However, some of the new lighter horticultural oils (“summer” oils) can be applied even after leaf emergence. If your tree is fairly short, most backpack or handheld spray units will reach the topmost branches. If you use a “summer” oil after bud break, make sure you keep applications of oil and sulfur separated by two weeks; oil can cause the sulfur to burn leaves and fruit. **Insecticidal Soap:** Aphids are often a problem on young fruit trees, sucking the juices from the undersides of the leaves and causing them to crumple and wither. We use a spray of Safer’s Insecticidal Soap to control aphids in the spring. Aphids in summer and autumn are not as detrimental to the tree’s growth and may actually encourage hardening-off in cold climates. **Leaf-Eating Caterpillars:** If you notice that the leaves of your young trees are being chewed, look carefully for some kind of leaf-eating caterpillar. There are many kinds, some tiny and some large. The Eastern tent caterpillar makes an easily identifiable nest between two twigs and is a common spring plague on fruit trees. If the tree is small and there are only a few worms, the “finger-pinch” method is most effective. Watch for caterpillars or for developing nests. With caterpillars, just squish them as you see them. With the nests, wait until evening or early morning when the caterpillars are all inside, then collect the spider-webby nest, throw it on the ground, and stomp on it. This is easiest when the nests are small, so get right on it as soon as you see one. The forest tent caterpillar looks like the Eastern, but does not make a tent. Both can be controlled with the biological spray “Bt,” a natural bacterial agent (*Bacillus thuringiensis*), which infects only leaf-eating caterpillars.

COMMON APPLE PESTS

Codling Moth. Pheromone traps lure male codling moths with a sex attractant and trap them. These can hang in the tree from bloom time on through the summer, two traps per mature tree. Replace them in eight weeks. Spinosad, marketed under the names “Entrust” and “Spinosad Lawn & Garden Spray,” is a natural control made from soil fungi. It contains a neurotoxin that kills codling moth larvae, as well as a broad range of other pests, yet reportedly has only limited toxicity to most beneficial insects. *Bacillus thuringiensis* (Bt) works on codling moth larvae and affects only caterpillars, but needs to be timed just right. Cyd-X is a commercial preparation of the granulosis virus that attacks codling moth larvae.

Apple Maggot. Apple maggots (railroad worms) overwinter in the soil after emerging from fallen fruits. Therefore, you can help break this cycle by keeping all drops picked up around the tree. Yellow monitoring traps and red spheres coated with Tanglefoot can be up to 95% effective against apple maggot. It takes up to six spheres per mature tree, and they should be hung three weeks after the flower petals fall. Repeated applications of the clay solution “Surround” also suppress apple maggots. (See Plum Curculio).

Plum Curculio. The only natural control to date that has been successfully used against plum curculio is a kaolin clay solution, presently being marketed under the name “Surround.” This compound forms a physical barrier against the curculio via a thin grey film over the leaves that does not interfere with photosynthesis or respiration in the leaf but inhibits the bug’s attack. It must be reapplied several times during the season, three times successively at full bloom and at least once weekly thereafter through late June, but can provide good control. An unsprayed “trap tree” or two will help prevent curculios from “waiting you out” only to descend on your orchard as soon as Surround spraying is stopped.

VARMINT CONTROL

Deer: The best deterrent to deer and moose damage is a fence. In places where a fence is impossible, try Plant Pro-tec units. Each unit is a tube of concentrated garlic and hot pepper, with a semi-permeable membrane that allows the odor out, but does not allow oxygen in. Thus the active ingredients remain potent for 6 months.

Voles (meadow mice): Screens are the best protection! Pre-cut hardware cloth screens may be found in our catalog or on our website.

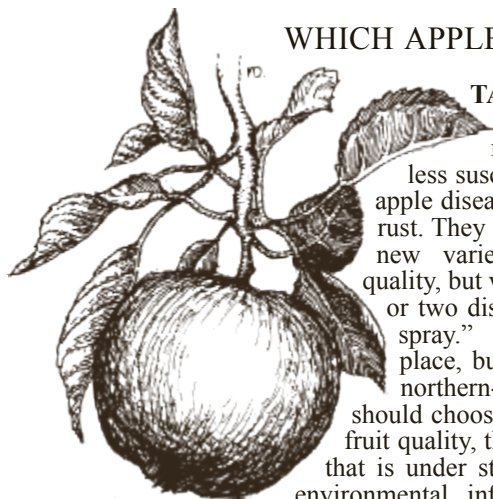
PROTECTION AGAINST SUNSCALD

During the late winter months (especially March) the warm sun will often cause sap to rise daily in the overwintering fruit tree. As temperatures cool toward nightfall, the sap returns to the roots. Sometimes, however, a particularly rapid drop in temperature will “catch” the sap in the trunk, freezing it and splitting the bark. This injury is known as “sunscald”, or “southwest injury,” and is often noticed only months later. To discourage the sap from rising, paint the trunk of the tree, from the base up to the first branches, with whitewash or

white *interior latex* paint. (See photo page 19.) **The goal is to lighten the bark color** so that it will reflect late-winter sunlight and stay relatively cool. Do not use oil-base paints; they do not allow the bark to breathe. The paint job need not be neat and tidy; simply slop it on and it will usually last 1 to 2 years. Good coverage at the ground level will also discourage tree borers, or at least make their egg slits easier to spot.

Sometimes honeydew from aphids or sap from an injury will drip on the trunk and turn black. This black spot can absorb heat, contributing to sunscald in late winter. Use a small brush with soap and water to wash such deposits off the trunk.

WHICH APPLES SHOULD I CHOOSE?



TAKE DISEASE RESISTANCE WITH A GRAIN OF SALT.

“Disease-resistant” varieties have been bred to be less susceptible to some commonly troublesome apple diseases like scab, fireblight, and cedar apple rust. They are not resistant to insect damage. These new varieties generally have acceptable fruit quality, but while they boast greater resistance to one or two diseases, they are not “easy care” or “low spray.” Disease-resistant cultivars have their place, but should be planted together with other northern-hardy varieties. Northern growers should choose apple varieties first for their vigor and fruit quality, then for their disease resistance. Any tree that is under stress from lack of hardiness or adverse environmental influences will be more susceptible to disease, whether it is genetically disease-resistant or not. Resistant does not mean immune. Learn each tree’s growth habits, strengths, and weaknesses, and attempt to keep it free of stress. A healthy, well-maintained tree will produce better and more disease-free fruit than a stressed-out “disease-resistant” tree.

FOR THE COLDEST CLIMATES, STANDARD FRUIT TREES ARE THE BEST CHOICE. Over the past few decades, dwarf and semi-dwarf apple trees have boomed in popularity. These trees can be attractive to owners of small yards because of the trees’ slight stature. You’ve also likely heard that dwarf trees tend to fruit sooner; while that may be true for growers in more temperate regions, it is not the case in Zones 3 & 4.

How Dwarf Fruit Trees Came About. It is the rootstock that determines the ultimate size of the tree. There are “standard,” “dwarf,” and “semi-dwarf” rootstocks. “Dwarf” trees are made by grafting a cultivar onto an inherently weak rootstock, which stunts the growth of the tree. Dwarfing rootstocks were originally developed in England, where long, cool, damp growing seasons can cause apple trees to produce an excessive amount of foliage instead of producing fruit. These rootstocks were chosen precisely because they lacked normal vigor. Grafting cultivars onto such roots is like putting a tourniquet around the stem; the tree simply cannot get as many nutrients, and so does not waste energy on excessive vegetative growth.

England’s climate is equivalent to USDA Zones 6 and 7, with a growing season about twice the length of ours here in Northern NY. In our abbreviated growing season, a tree needs all the vigor it can muster to leaf out, flower, fruit, and then harden off for winter, all in the space of a few short months. A dwarf or semi-dwarf tree, because of its subnormal vigor, cannot put out the spurt of growth necessary to thrive in the short season of a northern climate. The result is often poor growth and equally poor fruiting, even for varieties which would otherwise do well in northern regions. In fact, dwarf and semi-dwarf trees have so little vigor that they cannot compete with sod (grass and weeds) for available nutrients. Even in the warmer Zones 5 and 6, dwarf trees will often languish if sod is allowed to grow around them. Commercial chemical orchards solve this problem by applying herbicide around the base of their trees, an option which most backyard gardeners would choose to avoid. Dwarf trees also have a much shorter life span than standards. Most dwarf apples must be replanted every 10–20 years, whereas a healthy standard apple tree will often outlive the planter if all goes well!

St. Lawrence Nurseries' primary focus is on standard-sized fruit trees. Dwarf and semi-dwarf trees generally do not have the hardiness and vigor needed to thrive in our harshest winters, but can be a good addition to orchards in Zone 4b or warmer.

WHAT IS “STANDARD?” Although the word “standard” implies that all apples grafted onto standard rootstock grow to be about the same size; this is not the case. For instance, Red Delicious or McIntosh seeds from cannery waste have often been used to grow “standard” rootstock. Growing in Zone 6 or 7, trees grafted to these rootstocks will often reach a mature height in excess of 30 feet, necessitating a 40-foot orchard spacing and long ladders. In contrast, *Malus antonovka*, a “standard” seedling rootstock, when grown in Zone 3–4 without pruning, will produce a 15-20 foot tree. (See photo on p. 22.) The same tree can be kept at 10–15 feet by annual pruning. We use Antonovka for our apple rootstock. It is the most tried-and-true rootstock known, having been used for 500 years in Russia. Northern-grown and well-pruned apple trees on Antonovka rootstock are similar to “semi-dwarf” trees in size, yet still retain the necessary vigor to flower, fruit, and become dormant within the time constraints of a short growing season.

WHY DO MY APPLE TREES LOOK SKIMPY ON ROOTS? If you have ever purchased dwarf or semi-dwarf apple trees from other nurseries, you may have noticed that their roots look quite different from the roots on our standard trees. An apple tree on a standard seedling-grown rootstock (like ours) is often much more “carrot-rooted” than its counterpart on dwarf stock. Dwarfing rootstocks are produced by “stooling,” a process in which branches are bent to the soil and rooted along their length. This produces trees with many tiny fibrous roots, but no main taproot. Fibrous roots are efficient at getting water but have little sugar storage capability. On the other hand, standard rootstocks are **grown from seed**. They are “real trees” and, when dug, often exhibit pronounced taproots. Their side roots are often minimal, limiting their ability to get water, but their large taproot has tremendous sugar storage potential and so holds good reserves for growth. With adequate water, they will establish much more securely than their dwarf counterparts.



APPLE DISEASES

APPLE SCAB is a fungus which is exacerbated by wet weather. Make sure that there is good air circulation around each tree. This means keeping brush and tall weeds away from the immediate vicinity around the tree, and planting on hilltops or hillsides where breezes blow. Scab can be controlled organically to some degree with sulfur spray. It can be applied in the spring when careful monitoring of temperature and the duration of wetting periods has determined that infection is likely, and later in the summer when rain encourages secondary infections. Applications of sulfur can be mixed with horticultural oil before bud break, but spraying the two together after bud break will cause burning of leaf tissue. Pure neem oil is difficult to spray but is an effective scab inhibitor, and promotes orchard health by supporting healthy soil and canopy organisms. A few growers use copper sprays, called “Bordeaux mixtures,” sometimes in combination with horticultural oils, to control scab before the buds leaf out. However, copper is toxic to earthworms and mammals and can hurt the plant if sprayed after bud break. It has also been found that liming in the fall (only if your soil is not alkaline) and then mowing or spreading a compost layer over the leaf debris under the trees can limit the number of spores that are carried through the winter.

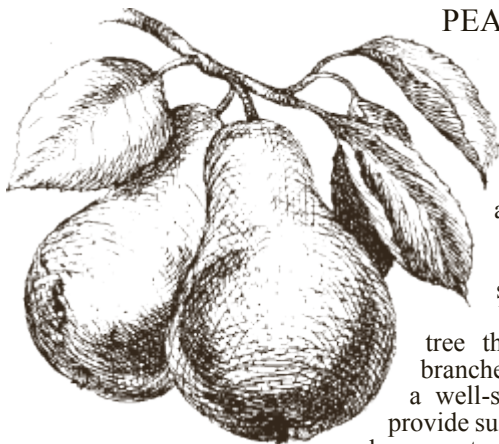
FIREBLIGHT is a bacterium and is more difficult to control. There are areas of the country where fireblight makes growing apples and pears very difficult. It is usually noticed when infected leaves and branches suddenly turn brown, appearing as if they have been scorched by fire. Branch tips may also display the diagnostic “shepherd’s crook” appearance. Closer inspection may show a clear to reddish ooze from infected tissues. Fireblight is worse during periods of moisture and in spring and early summer when there is lots of fresh new growth. There is a new biological preventive/control for fireblight, “Serenade” (*Bacillus subtilis*), which is composed of friendly bacteria that inhibit the growth and spread of fireblight. Because this product works by “taking the parking space” from fireblight, its successful use depends upon early recognition of the symptoms. In areas where risk of fireblight is high, “Serenade” should be applied before any signs of the disease are noticed.

A serious infestation of fireblight may require removal and burning of affected portions (or trees, if necessary). However, try to wait until mid-summer, or even better, until winter, to cut out and dispose of affected parts, and never cut when the bark is wet. If you do cut out fireblight with pruners, be sure to disinfect them with a 3% solution of hydrogen peroxide or 10% Clorox solution, so you don’t pass the infection along. (These disinfectants will corrode your pruner blades, so be sure to oil them afterward.)

CEDAR APPLE RUST is a fungus. Since it requires Eastern red cedar or other junipers as its intermediate host, it occurs only where these intermediate host species exist close to the orchard. The best control is to cut out all cedars within two miles of the orchard and apply a sulfur spray in the spring.

Do not confuse Eastern red cedar, *Juniperus virginiana*, with the common white cedar, *Thuja occidentalis*, which is not a host for cedar apple rust.

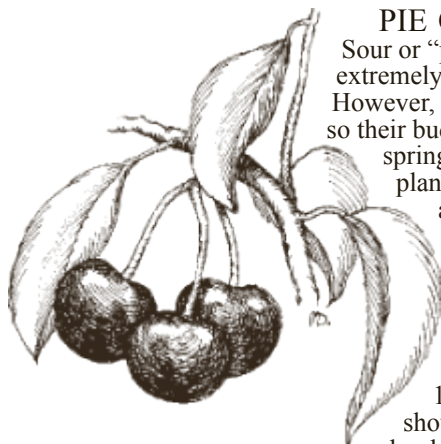
PEARS



Cultural requirements for pears are similar to those for apples. Pear trees on standard seedling rootstocks (like ours) are particularly “carrot-rooted,” with a good taproot but almost no “feeder” or side roots. This lack of side roots means that pears often need extra watering during the first season. Sometimes our customers are a bit disgruntled when they receive a pear

tree that has one long root with no side branches or root hairs. But this large taproot is a well-stocked storehouse of sugars that can provide sustained energy for the growth of the tree, and a pear tree that is watered daily should rapidly

become established and make good growth. There are many pear trees that are over 300 years old, and their deep taproot probably plays a role in their longevity. Pears require less pruning than apples. Their growth habit is columnar rather than spreading, allowing them to be spaced as close as 20 feet apart. Heavy pruning to try to shape them like an apple tree will cause massive suckering in a very upright direction. Three or four stems, each several feet long, can sprout in response to each pruning cut. To keep this response to a minimum, prune only to eliminate crossing or rubbing branches and dead wood. **Fireblight** is a serious bacterial disease of pome fruits (apples, pears) and has severely limited commercial pear production in the Northeast. Most backyard growers will never experience fireblight; however, there are some fireblight-prone areas where only Ussuriensis-cross pear cultivars (Ure, John, Jubilee) with excellent fireblight resistance will survive. Fireblight is usually noticed when infected leaves, branches, flowers, and fruit suddenly turn brown, appearing as if they have been scorched by fire. Branch tips may also display the diagnostic “shepherd’s crook” appearance. Closer inspection may show a clear to reddish ooze from infected tissues. A new biological control, “*Serenade*,” has shown promise for treatment and prevention. (See p. 30.) Serious infestations may require that affected portions be cut out and burned up, including whole trees if necessary. Be sure to disinfect pruners between cuts with a 3% hydrogen peroxide or 10% Clorox solution. Streptomycin is occasionally useful against the fireblight bacterium if the infection is caught in its early stages. As with all fruit trees, a dormant oil application in late winter is recommended to smother overwintering insects on the stem. **Pears are susceptible to pear leaf blister mite and pear psylla**, but a good application of dormant oil is effective against both. Occasionally the blister mite will reinfect during the summer. It causes black splotches on the leaves and raised blister-like bumps on the bark. If this happens, try one of the new summer-application horticultural oil sprays with a low volatility rating (distillation temperature) of 412°F. They are light oils that will not hurt the leaves and may be used during the growing season. A foliar feed may be applied with the spray if it is May or June. Be sure not to use the regular type of dormant oil for summer spraying! Another promising control for pear psylla is the kaolin clay solution Surround, which provides a physical barrier that inhibits the pest’s attraction to the leaf.



PIE CHERRIES

Sour or "pie" cherries are able to live through extremely cold winters (-40°F or colder!).

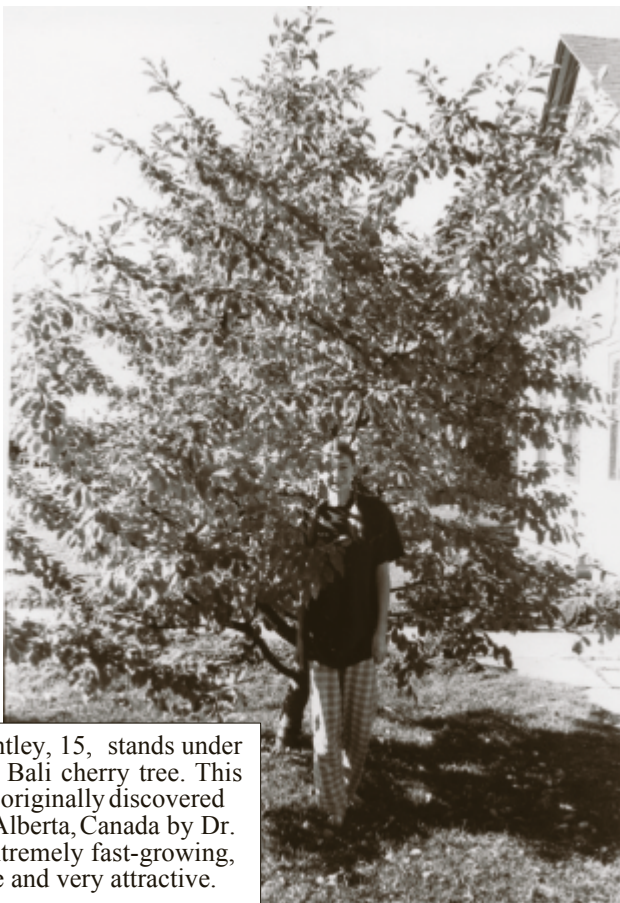
However, they flower very early in the spring, and so their buds or blossoms can often be damaged by spring frosts. Because of this tendency, try to plant them in a protected spot. It also helps to apply a heavy mulch around the trees in late fall to insulate the ground from early spring warmth; this can help delay flowering.

All of our pie cherries are fairly small trees. They reach a mature height of only 10–15 feet in northern climates. They should be planted 10–15 feet apart. Pruning should be light, restricted to keeping dead wood

removed, eliminating crossing branches, and "opening up" the top to sunlight. Air circulation is a prime consideration, since cherries are particularly prone to fungal problems like brown rot, which can affect the fruit and branches.

Soil requirements for pie cherries are similar to those of other fruit trees; they like light, loamy soils with a pH of 6.8–7.0 and do not like "wet feet." Pie cherries are self-fruitful, but your yield will improve with more than one variety.

Black knot (see Plums) may affect cherries, and occasionally a virus will claim a cherry tree. They can also be prone to fungal plagues such as leaf spot, brown rot, and perennial canker. The book *Diseases of Tree Fruits*, available through our catalog, is especially enlightening on these "stone" fruits and their common disorders.



Bali MacKentley, 15, stands under a 5-year old Bali cherry tree. This pie cherry, originally discovered growing in Alberta, Canada by Dr. Evans, is extremely fast-growing, productive and very attractive.

PLUMS

St. Lawrence Nurseries sells both seedling and grafted plums. Our grafted plums are of two pollen groups:

Group A: *Prunus salicina* × *P. americana*, crosses between the Japanese and American plum.

Group B: *Prunus domestica*, the European plum.

Unless your grafted plum is self-fruitful, make sure another variety of the same pollen group is present. Our seedling Native American Plums are very vigorous and productive and will pollinate another seedling plum or a grafted plum of the A type. They can be interplanted with A-type grafted plums or used for hedges, borders, and other landscape settings. Plums are small trees, seldom reaching more than

15 feet at maturity. They may be planted 10–20 feet apart, making them a good choice for tight quarters. Plums have a shorter life span than apples or pears, living only 20–30 years. Because they flower early like cherries and apricots, late spring freezes are a hazard for plums, often freezing flower buds, flowers, or even the young fruit. Applying a heavy mulch around the trees in late fall will often insulate the ground from early spring warmth long enough to delay flowering for a few days to a week, which can be enough to make the difference between crop success and failure. Plums do not develop a strong scaffold of branches. Crotch angles are often narrow—barely 30 degrees—and difficult to train. Only light pruning is recommended, mainly to remove dead wood, broken branches, or particularly weak crotches. Shortening limbs will help to reduce the load on the limb crotch.

The Plum Curculio, a small hard-bodied beetle, regularly ravages plum crops. At present, the only organic control for this pest is a spray of kaolin clay solution (“Surround”—see pp. 26–27). Keeping all drop fruit picked up under the tree helps. Also, the old adage about perfect plums in the chicken yard has merit—chickens love to eat the curculio! Chickens in the plum orchard will serve as a biological control for this insect.

Black Knot is a fungus which causes a lumpy black growth on the branches. Severely affected trees should be removed and their branches burned. In trees that are marginally affected, cut 6 inches below the canker. Sterilize pruners between cuts. (See p. 30.) European plums (*Prunus domestica*) are more susceptible than Japanese/American types (*Prunus salicina*/*P. americana*).

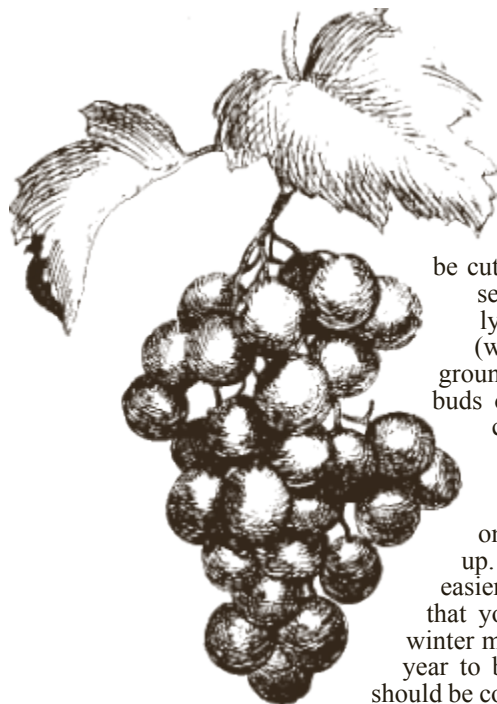


P. domestica



P. americana

“**X virus**” is another disease, quite often the culprit responsible for unexplained sudden death in *Prunus* species—plums, cherries, and apricots. Like black knot, it is carried by chokecherries and black cherries, so removal of these wild sources can help control its spread.



GRAPES

The grape plant which you receive from us is a rooted cutting. It is a rather dead-looking, tangled vine with roots. You must sometimes look carefully at a grape cutting to determine which end is "up." The above-ground or stem portion will be cut back to 1–4 buds. The plant should be set into the ground at a sharp angle, almost lying down, with the crown of the plant (where the top cane meets the roots) at ground level, and the stem (the part with the buds on it) above the ground. Planting the cutting in this tilted position, rather than straight up, will encourage double or multiple stems to grow up vertically from a low horizontal main trunk. If one stem dies, there is another to back it up. A tilted main trunk will also make it easier to bend plants to the ground each fall so that you can cover them with mulch for the winter months. The grape plant will take about a year to become established. After this, a trellis should be constructed to support the plant. In milder

climates, many grape growers do their pruning in the fall, but northern growers are better off leaving all excess growth on the plant over the winter, so that there are more live canes to choose from if the plant suffers winter injury. Annual pruning to renew the plant should be done in March or early April while preparing to fasten the canes to the trellis. In addition, cold-climate growers should encourage "low heading," or side branching as close to the ground as possible, allowing more of the plant to enjoy the protection of snow cover during the winter months. A grape trellis is a simple structure consisting of several fenceposts supporting two main wires. A branch from the main stem of the grape plant is run in each direction on both wires for a distance of 2 to 4 buds and tied to the wire. All other canes should be removed. The first trellis wire should be positioned about 1.5 to 2 feet from the ground, supporting the lowest pair of "arms" emerging from the main trunk. The top trellis wire should hold a second pair of "arms" about 3 to 5 feet from the ground. Even though our grape varieties are among the most cold-hardy cultivars known, growers in Zones 3–4 can help their grapes winter over by untying the branches from the trellis each fall, laying the plants down on the ground, and covering them with hay, straw, or leaves. You may have to do a bit of fall pruning in order to get the canes off of the trellis. Grape plants should be spaced 6–8 feet apart in the arbor. They prefer a rich, well-drained soil with a pH of about 6.8. Keep weed competition to an absolute minimum by mechanical or hand cultivation and generous mulching.

On our website, we offer the book *The Grape Grower: A Guide to Organic Viticulture* by Lon Rombough. This is a comprehensive manual to grape growing and is indispensable to the novice and experienced grower alike. The booklet *Growing Grapes in Minnesota*, prepared by the Minnesota Grape Growers Association, also covers the subject of northern grape culture in detail.



CURRANTS & GOOSEBERRIES

Members of the “*Ribes*” family are relatively unknown in the U.S. but have been cultivated for centuries in northern Europe. The fruit may be eaten fresh or used for pies, jams,

jellies, or juice. Red currants, black currants, and gooseberries reach a mature height of 3 to 5 feet. They will live 40 to 50 years or more. The plants should be spaced 3 to 5 feet apart, with at least 6 feet between rows. Currants and gooseberries like rich, moist soils with a pH of 6.0–7.0. The bushes thrive when there is plentiful organic matter in the soil and should be mulched annually. They are somewhat shade tolerant, but will produce more fruit in full sun. Annual pruning increases yields and keeps plants manageable. Since the majority of fruit is borne on 2- and 3-year-old canes, older canes should be removed. This rejuvenates the plant, stimulating the remaining canes to grow vigorously and produce large crops of premium-size fruit. Plants which have long been fruitless may be quickly restored to healthy production by mulching and pruning. Pruning should occur in March or early April.

Black Currant, Red Currant, and Gooseberry Pruning:

- They produce the majority of their fruit on 2 and 3-year-old shoots.
- Shoots 4 years and older produce very little fruit.
- After the first growing season, remove all but 4 - 5 vigorous, healthy shoots.
- The following year, leave 4 or 5 one-year-old shoots and 3 or 4 two-year-old canes.
- After the third growing season, keep 3 or 4 shoots each of one, two, and three-year-old growth.
- Prune in late winter or early spring, before bud break.

Because *Ribes* species serve as an intermediate host for the white pine blister rust fungus, they are still banned in several states, although the federal ban was lifted in 1966. The black currant cultivars “Consort” and “Titania” are highly resistant to white pine blister rust. As of 2003, it is legal to grow red currants, gooseberries, and immune or resistant cultivars of black currants throughout New York State. There are a few pests that bother currants and gooseberries. Currant aphids cause the leaves to be cupped and distorted. They are mostly a cosmetic problem and can be controlled with Safer’s Insecticidal Soap (for source, see pp. 46–47). The currant borer tunnels into and up through canes. Borer damage is minimized when canes past their fourth year are routinely removed from the plant. The currant stem girdler is a sawfly that lays her egg in the stem and then girdles the stem right below the tip, which usually wilts and falls off. It can be controlled by cutting 2–3 inches off the tips of affected canes in May or June. Our own currants seem to be bothered most by the gooseberry fruitworm, which lays her eggs on the developing fruit. The larvae enter the fruit, shriveling and discoloring some of them, and often spin spidery webs around clusters of berries. There is no good control for this, but since the adult is a moth that is active during the time the berries are forming, some sort of sticky trap might work, perhaps with red color as an attractant.



BLUEBERRIES

Checklist for Growing Blueberries

1. **Do not plant too deep; plant in surface layers of the soil.**
2. **Provide adequate water after planting.**
3. **Maintain soil pH at 4.0–5.5.**
4. **Keep free of weeds, but do not disturb roots.**
5. **Mulch annually with an acid material like pine needles or sawdust.**
6. **Cultivate only lightly.**
7. **Prune mature plants annually (in early spring before flowering).**
8. **Fence to keep out mice, rabbits, deer, etc.**
9. **Irrigate (drip or overhead) during fruit enlargement and ripening.**



Site and Soils. Blueberries like a well-drained, highly acid soil with access to plenty of water. Naturally occurring highbush blueberry bogs are wet enough to make your sneakers squish while you are picking berries, but each bush is “high and dry” on a hummock of higher ground composed of soil, sphagnum moss, and organic matter. Abundant water, especially important during fruit enlargement, is readily available, but the plant roots are not drowning. At the other end of the spectrum, the wild lowbush blueberry grows in sandy, often dry soils. Where the sand is close to the water table, berries flourish annually, but in the drier uplands, good lowbush berry seasons depend on local rainfall. Insufficient rain will result in berries that shrivel or fail to reach full size during the fruiting season. Wild berries grow only where the soils are very acid, with a pH of 3.5 to 5.0. A highly acid bog or upland dune patch is annually endowed with leaves or needles from the acid-loving plants growing there, which add organic matter and maintain soil acidity. Mimicking nature gives the best results for blueberry growing. Find a spot that is well protected from late spring frosts, acidify the soil with heaps of acid mulch every year, provide access to plenty of water, and “voilà!” you will have blueberries. Surprisingly, the backfill sand around the foundation of your recently built house can be a good spot, and blueberry plants make an attractive “edible ornamental.”

Spacing. Be sure to space your plants far enough apart so that you will be able to pick the fruit without having to squeeze between plants. Simply brushing by a fully loaded blueberry branch heavy with ripe fruit can cause many berries to fall off. Chippewa, Patriot, Polaris, and Superior will spread to a width of about 4 feet. They should be spaced 4–5 feet apart in the row. Bluejay, Duke, Huron, Jersey, Nelson and Northland can sprawl to 5 feet wide, so a 5–6 foot spacing is warranted. Plants like Northblue and Northcountry, which mature at about 2 feet tall and spread to about 4 feet wide, should be spaced 4 feet apart in the row. Be sure to leave a full 6–8 feet between the rows to allow freedom of movement when picking.

Planting. The root systems of blueberry plants are comprised of a mass of tiny rootlets ending in millions of root hairs. These sensitive roots need oxygen. They thrive in loose soil with no competing weeds and a heavy mulch of acid organic matter. They spread out widely, often suckering to send up new canes, and remain fairly close to the soil surface. We’re reminded of the fellow who just couldn’t get his blueberry plants to grow. Conditions were perfect: soil, mulch, pH, the works. He then showed us how he laboriously cultivated deeply around each plant, unknowingly eliminating a good percentage of its roots.

BLUEBERRIES, continued

Blueberries should be planted in a way that allows the roots to spread out, in shallow holes. The roots will be just under the surface, with the canes poking above the ground. The soil should be pressed firmly around each plant and watered well. Heavy soils are not good for blueberry roots.

Mulching and Soil pH. Mulch, mulch, mulch! Create an environment where only blueberries like to grow. Most common garden weeds can be discouraged by an annual 6–8 inch layer of naturally acid mulch around the plants. We use pine needles, which are readily available from the pine woods nearby, and ground bark from a nearby sawmill. Pine or oak sawdust, oak leaves, peat, or any other naturally acid mulch will work. Yellowing of leaves on young blueberry plants may mean that your soil is not acid enough. Blueberries do not require high nutrient levels, but they do require an acid environment to take advantage of the nutrients that exist in the soil. The soil for blueberries should be at a pH of 4.0–5.5. Take time to test the pH of your soil. It is an easy-to-do test that can be obtained from your local Cooperative Extension or farm supply store. (See p. 10.) If your soil has a pH higher than 5.0 and does not respond to acid mulching, you can use elemental sulfur to acidify it more rapidly. However, sulfur should be used sparingly, for it can burn or even kill young plants. Sprinkle 1 tablespoon of sulfur lightly around each plant and let it dissolve into the ground at its own pace, or mix thoroughly with mulch and then mulch the plants. When amending the soil with sulfur, give the plants enough time to start showing the effect. It can take several weeks or longer for the leaves to regain their healthy green color. Once the plants are growing well and no more yellowing is occurring, natural acid mulches should be enough to maintain the desired pH.

Fertilizer. Blueberries are not heavy feeders. In fact, recent research shows that, contrary to previous recommendations, they need hardly any additional nitrogen during the growing/fruiting season. Go easy on NPK, and if you are an organic grower, use only compost and acid mulches. Do not fertilize after June 15.

Irrigation. While blueberries cannot tolerate wet feet, they need access to plenty of water. This is critically important during the period of fruit enlargement, which begins just after fruit set and ends just before ripening. Drip irrigation is one inexpensive way to ensure adequate moisture to the fine, hairlike blueberry roots. Overhead irrigation such as a lawn sprinkler will also work, but uses considerably more water.

Netting for Birds. Want to attract birds to your property? Plant a blueberry patch! We guarantee that you will soon earn a reputation among your feathered friends as the #1 hangout of the neighborhood. You may not think birds are a problem at first. We didn't. But then we noticed that the blueberries that were "almost ripe" yesterday never got any riper. (Actually, the birds were eating them as they got ripe.) It is highly advisable to net your plants, whether you have a large commercial planting or a small berry patch. One-inch nylon mesh works well. It should be put up during early fruit production and taken down just afterward. Never leave the net up year-round. You will want to erect some sort of support (we use tall posts with wires strung across the tops) to hold up the net. Make it tall enough to allow for head clearance. Remember, it will droop down some. Also, rabbits love to nibble on blueberry shoots and will often chew through bird netting to get to them. This leaves gaping holes through which the birds gladly follow the rabbits. We solved this by surrounding our patch with a permanent, 4-foot-tall 1" × 2" welded wire fence, dug in well at the soil level, the top of which forms a convenient attachment point for our overhead net during fruit season. Bird netting is relatively inexpensive and will easily pay for itself in one year. With proper care, the netting should last 20 years or more.

BLUEBERRIES, continued

Pests and Disease. Healthy blueberry plants are bothered very little by pests and disease. If you have problems with leaf-eating caterpillars, Bt (*Bacillus thuringiensis*) should take care of them, although the “finger pinch” method is often just as effective. Mummyberry can be a problem. This is a disease which results when infected berries fall to the ground, allowing the fungus to overwinter, where it produces a cluster of small cup-like mushrooms the following spring. These mushrooms “shoot” their spores up onto the plant, which infects first the developing leaf buds, then the flowers of the plant, thus starting the cycle all over again. Because it is a fungus, mummyberry is worse in wet years. It helps to keep all drop berries picked up, especially directly under the plant. You can rake the old mulch and debris out from under the bushes in the fall and replace it with new mulch. Lightly hoeing the mulch under the bushes in early spring (March) will help disturb sprouting mushrooms. Or, if you have chickens, let them scratch up the mulch in early spring. After pruning, remove all pruned-off wood from the blueberry patch to prevent the cycling of disease.

Picking Fruit. The best way to assure top-quality fruit is to delay picking until several days to a week after the fruit has turned fully blue. This waiting period allows the pulp to go from mealy (as in many supermarket berries) to soft, juicy, and flavorful. Waiting for this extra flavor and juiciness to develop will not significantly reduce the shelf life of the berries, especially since you are not a commercial grower shipping them across the country. Both you and your customers will be amazed at how much better fully ripened blueberries taste.

Pruning. Blueberry plants live to be 40–60 years old. Once they are mature (five to eight years old), it’s a good idea to renew the plants annually by pruning, removing all dead canes and excess canes. You should remove one to three of the oldest canes each year, pruning them to the base of the plant at the soil level. In a vigorously growing adult, all canes should have been renewed every six years. In the far north, where growth is slower, this cycle can be extended to eight or nine years for complete renewal. Do not begin removing canes until your plant is a fully grown adult.

Hardening Off. Do not encourage late-season blueberry growth by fertilizing, mulching, or foliar feeding after mid-June. Fertilizer or foliar feeding sprays applied later than this in northern areas can cause plants to grow during the time that they would normally be slowing down and hardening off for winter. The result is that the plants are “caught with their pants down” by the arrival of cold weather, resulting in winter injury. Mulch may have the same effect if applied after June 15. The best times of the year to mulch are after the ground has cooled and the plants are fully dormant in the fall, and/or after pruning but before flowering in the spring. You can also help your blueberry plants escape winter injury by making sure the surrounding soil is as moist as possible before fall freeze-up. Plants desiccate during winter cold snaps. Occasional thaws allow plants to bring up badly needed water into dry stems and twigs. Thus, a plant’s ability to survive winter is closely associated with water availability to the roots. In young plants whose roots are not developed, watering in the late fall, after leaf drop but before the ground freezes, helps plants counter the desiccating influences of winter.



JUNE BERRIES

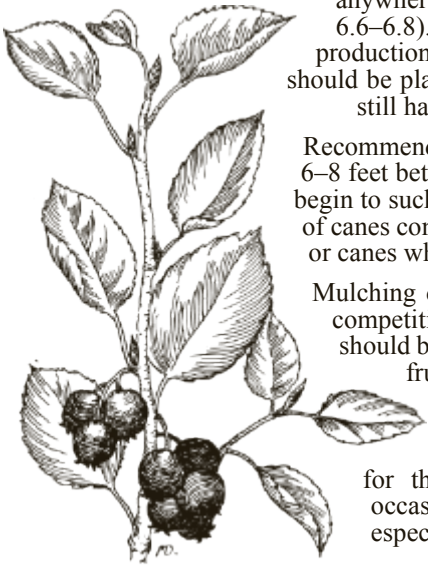
The fruit of the juneberry resembles a dark blue-black or reddish blueberry. The big advantage of juneberries over blueberries is that they tolerate a wide range of soils and pH. Winter damage is not a worry, since juneberries are hardy to -50°F , thriving even in the windswept prairie provinces of Canada, where they are grown commercially as "Saskatoons."

We sell two types of juneberries. *Amelanchier canadensis* is a multiple-stemmed shrub/tree that is used primarily as an ornamental but is also very good to eat. *A. canadensis* can reach 25 feet tall, although there are some shorter varieties. It is better adapted to eastern soils. *Amelanchier alnifolia* grows very much like a highbush blueberry, producing a large bush, 6–10 feet tall, with multiple canes. *A. alnifolia* is partial to western soils.

Although juneberries as a whole are not especially fussy and will thrive almost anywhere, they seem to do best in sweeter soils (pH 6.6–6.8). Full sunlight is best for maximum fruit production, and since juneberries are very long-lived, they should be planted in a spot where, 40 years hence, they will still have full sun.

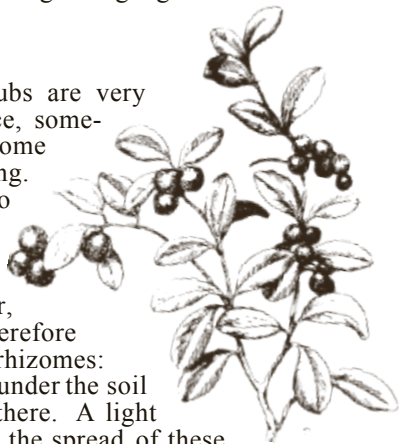
Recommended row spacing is about 8–10 feet apart, with 6–8 feet between plants. Once plants come into bearing and begin to sucker, do some annual pruning to keep the number of canes constant, removing any damaged or very old canes, or canes which have gotten leggy.

Mulching directly beneath the bushes will help eliminate competition from weeds. "Quack" or "witch" grass should be dug out. Also, adequate water is a must for any fruit crop, and access to either a drip irrigation or overhead water system should be considered when planting a patch. Because juneberries are fairly disease-free, they are a good choice for the organic fruit grower. They are, however, occasionally bothered by scab or fireblight, especially in wetter growing regions.



LINGONBERRIES

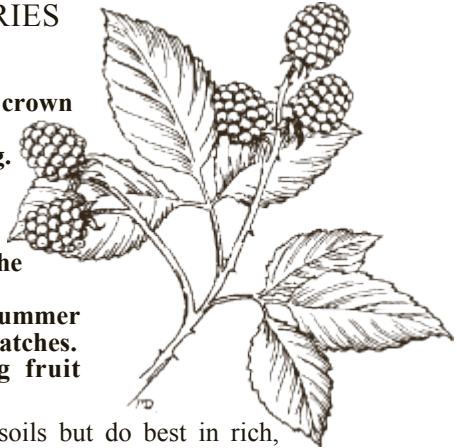
These small, circumpolar, evergreen shrubs are very hardy but require special care and patience, sometimes taking one or more seasons to become established and start growing and spreading. The culture of lingonberries is very similar to the culture of blueberries. A low pH, light soils, plenty of organic matter and adequate water are essential for success. Please check the blueberry section for specifics. However, lingonberries are not woody plants, and therefore will not require pruning. Growth is by rhizomes: horizontally-growing roots that spread just under the soil surface, popping up a new plant here and there. A light mulch and plenty of water will encourage the spread of these plants. Hand weeding is preferable to hoeing, since their roots are delicate and very close to the surface. They should be spaced about 1 ft. apart in the row, with 3 to 5 feet between rows.



RASPBERRIES

Checklist for growing raspberries:

1. Do not plant too deeply; buds at root crown must see light.
2. Provide adequate water after planting.
3. Once established, till or work the soil deeply on each side of the row to prevent unwanted rootsprouts.
4. Mulch with lots of organic matter *in* the row, but not between rows.
5. Mow Fall berries after harvest; prune summer berries by hand or mow alternating patches.
6. Irrigate (drip or overhead) during fruit enlargement and ripening.



Raspberries will grow in a wide variety of soils but do best in rich, well-drained loam with a pH of about 5.5–6.5. Soils rich in organic matter are highly desirable. An annual mulch of manure, leaves, compost, or even sawdust to the area around the plants in the row or bed (but not to the area in between, which should be tilled every so often to discourage suckering) will encourage heavy fruit production. The mulch should be applied as a 6–8 inch layer on top, not worked into the soil. Such a mulch can help retain soil moisture and suppress weeds.

The most common mistake with raspberries is planting them too deeply. Raspberries are woody perennials that send up shoots from the ground every year. When a rooted cutting is made, the cane is cut off and discarded. The remainder of this cane, attached to the cutting, may die back or sprout new leaves, **but the root crown** is the part that will give rise to the new plant, and this is the portion that must have access to light in order to grow. (See photo at right.)

Red raspberries can be planted in single rows or in beds of closer-spaced double rows. For single rows, space plants 2–3 feet apart within the row. If you want a denser planting, grow beds of double rows, with 3 feet between each plant in the row and 12 inches between the two rows in each bed. Offset the plants in adjacent rows so that each double row has a plant about every 18 inches in a zigzag pattern. Leave at least a 5-foot-wide walkway between the beds or single rows. Rototill or work up the soil deeply in a strip 1–2 feet wide on either side of the row. Use a heavy mulch to control weeds within the bed or row, **but do not mulch between the rows or beds**, since this will encourage the unwanted expansion of your raspberry patch into your walkways.

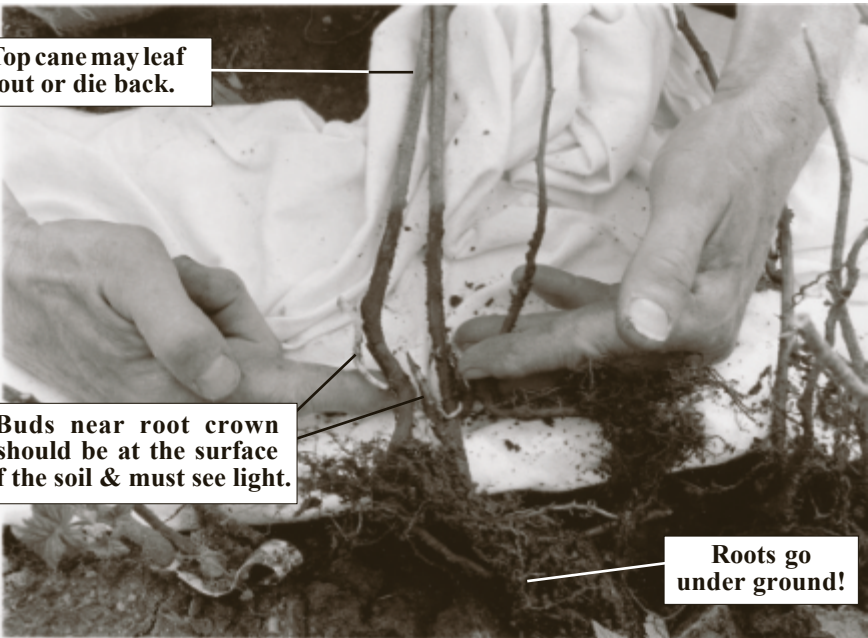
All red raspberries attempt to make two crops per year: a summer crop and a fall crop. Usually either one or the other is dominant. The fall crop is made on 1-year-old canes called primocanes. These are the new canes which begin growth in the spring, flower in late summer, and fruit in the fall. Since fall-bearing varieties yield their main crop on primocanes, these canes can be mowed down each season after their fruit has been harvested. The root will send up a fresh batch of primocanes in even greater abundance next year.

In short-season growing areas, fall-bearing cultivars must ripen their crop early enough to avoid the inevitable frosts of late September and October. Only the earliest fall bearers, such as Redwing and Autumn Bliss, are suitable for a fall crop in Zones 3 and 4.

If you are planting summer berries, there will be no main crop the first year. The summer crop is produced on 2-year-old canes (primocanes which have come through the winter), which flower and fruit from late June through early August.

Since the summer crop is borne on 2-year-old canes, a red raspberry cultivar chosen for its summer crop must be even hardier than the fall-bearing types, so that the primocanes will come through the winter without damage. With a summer crop (after the first year), you will always have two kinds of canes in your raspberry patch: primocanes and 2-year canes. After the 2-year canes fruit, they die and should be removed, either that fall or the following spring before growth recommences. An alternative to hand-pruning is to mow half the patch one year and the other half the next. This ensures that half your planting will have 2-year canes each year. Whether you are growing raspberries for a fall or summer crop, the patch will continue to spread underground and send up new primocanes each year as the root system expands.

Whereas red raspberries can send up canes far from the original plant to fill out the hedgerow, **purple and black raspberries tend to “stay put,”** expanding around the original stem by producing suckers from the base of the crown. They should be planted 3–4 feet apart in the row, with 10–12 feet between rows. No pruning is needed for the first couple of years—let the crowns broaden via suckering from the base. New canes (lighter color) emerge in early spring and can become quite leggy. Beginning in the third season, from May through late July, cut back new canes to a height of 3–4 feet. This will encourage side-shoot development (fruit buds are borne on side shoots). In late winter, cut away all but 4–5 of the strongest new canes from each crown and prune back the side shoots to about 12–18 inches. These canes will produce fruit in their second season, after which they should be removed at the soil level (August/September). Once planted, water raspberries throughout the spring and early summer during the first year. In subsequent years, provide water from fruit set until the end of the ripening period. Mulch well at least twice yearly.



Top cane may leaf out or die back.

Buds near root crown should be at the surface of the soil & must see light.

Roots go under ground!

When planting raspberry cuttings, make sure the living (green or white) buds near the root are not buried. These buds are where the new growth will come from. While the roots should be under the soil, the buds should be right at the surface so that light can reach them. The cane above may put out leaves or die back, but the top of the cane is unimportant compared to the buds near its base.

ASPARAGUS

Asparagus is a long-lived perennial vegetable that rewards patience. A well-prepared bed can produce for 20 years or more. Choose a sunny site with deep, well-drained soil and a pH of 6.5–7.0. Avoid wet or compacted soils. Because asparagus roots deeply, take time to loosen and enrich the soil before planting.

Dig trenches 6–8 inches deep and 12 inches wide. Space crowns 10–18 inches apart in rows 3–6 feet apart. Spread roots over a small mound of soil in the bottom of the trench and cover with 2–3 inches of soil. As shoots grow, gradually fill in the trench until level with the surrounding ground, keeping the soil loose and free of weeds. Asparagus needs consistent moisture, especially in the first two years as the plants establish.

Do not harvest the first year. In the second year, harvest lightly for 2–3 weeks. By the third year, a full harvest season of 4–6 weeks is appropriate. Stop cutting when spears become thin and allow ferns to grow undisturbed through summer; these feed the crowns for next year's crop. Mulch annually and remove dead ferns in late fall or early spring.

Jersey Knight is a vigorous, high-yielding green variety. Mary Washington is a traditional heirloom selection that is particularly well-suited to northern climates. Purple Passion produces thick, tender purple spears with mild flavor.

STRAWBERRIES

Strawberries are low-growing, perennial plants that spread by runners and form a dense groundcover over time. They prefer full sun and well-drained soil with a pH of 6.0–6.8. Avoid heavy clay or poorly drained sites. Work compost or aged manure into the top few inches of soil before planting, but do not over-fertilize, as excessive nitrogen encourages leaf growth at the expense of fruit.

Plant crowns so that the midpoint of the crown sits exactly at soil level. If planted too deeply, they may rot; too shallow and the roots will dry out. Space plants 12–24 inches apart in rows 3–4 feet apart. Water regularly during establishment. **Mulching** is particularly important for Northern growers; a thick layer of clean leaves or hay, applied in the Fall, will help protect the roots from extreme cold in the Winter. Good mulch is also helpful for keeping fruit off the ground during the following year.

June-bearing varieties such as Allstar, Honeoye, Sparkle, and Wendy produce one concentrated crop in early summer. Everbearing varieties such as Ft. Laramie and Ozark Beauty produce smaller flushes of fruit throughout the season. Remove blossoms the first year to encourage strong root development. Renovate June-bearers after harvest by **mowing foliage and thinning plants** to maintain vigor.

ELDERBERRIES

Rooted cuttings of elderberries, unlike seedlings, are genetically true to name. On receipt, these cuttings are not much to look at: a mass of roots with an “eye” or possibly one cut-off stem. Some cuttings are nondescript, making it hard to determine which part will give rise to the stem. Since **it is important that the plant not be placed in the ground “upside down”** (in which case it will probably fail to come up!). Look carefully for either a short above-ground stem or an “eye” similar to a large bud.

This “eye” should be planted at about ground level, with the rest of the cutting below ground. In the case of multiple “eyes,” try to plant such that each eye remains at about ground level. From such humble beginnings, elderberries will often grow 5 to 8 feet the first year and fruit heavily the second year.

Elderberry plants should be spaced 4 to 8 feet apart, with about 6–10 feet between rows. Rich loams and clays with slightly wet soil conditions are best suited to growing elderberries. Moist, loose soils will encourage elders to root and spread freely; however, they will drown in permanently soggy locations. Soil pH should be on the “sweet” side of neutral (slightly above 7.0).

Heavy applications of mulch encourage healthy production of new canes, as well as reducing weed competition, which can crowd out the elder root system. When hoeing around the base of elder plants, be careful not to sever roots that are close to the surface.

Under good growing conditions, canes will often fruit the first year. However, if you are not vigilant, the birds will harvest most of the fruit for you! Also, deer love to browse elderberry plants, so be sure to fence your patch. With regular applications of mulch, elderberries should fruit copiously for 20 to 30 years. Healthy plants may be expected to produce 12–15 pounds of fruit per plant.

Regular pruning will help to maintain elderberry plants in top condition. Canes older than 3 or 4 years should be removed, leaving an even mix of 1, 2, and 3-year-old canes.





A row of Black Walnuts

NUT TREES

Checklist for planting black walnut, butternut, buartnut, hickory, and oak:

1. Plant in rich soils—loam, well-drained clay, or rich bottomland.
2. Dig a hole deep enough to generously accommodate the taproot.
3. Pack soil firmly around the root and water amply the first growing season.
4. Mulch trees to prevent drying out of soil underneath.
5. Optional—foliar feed one or more times during the first month after planting (before June 15).

The walnut family includes butternuts, buartnuts, and black walnuts. Soils best suited to these species are rich loam and deep silt/clay bottomland. They are more tolerant than fruit trees of occasional wetness. They will become established in the rich, alluvial soils along riverbanks, in floodplain soils, and, to a lesser degree, on most other soils. Because they are less fussy about soils than fruit trees, nut trees often get “second best” when it comes to site selection, since the prime spots on the farm are reserved for the fruit trees. But before you run off to plant your walnuts on the less desirable sites on your property, let us point out that there

there is a direct correlation between soil quality and the growth rate of these trees. If you plant your nut trees in the richest soils, mulch them regularly, and supplement with foliar feeding, they will grow like the dickens, whereas in poor soils with little care they will hardly grow at all. We’ve seen black walnuts 15 years old that were only 2–3 feet tall! Conversely, we’ve seen them grow 3 to 4 feet in a year. One famous stand of black walnuts reached 100 feet in 26 years. Young **black walnuts** are very “carrot-rooted”; their entire root system is comprised mainly of one large taproot. There is no root “ball,” no large fibrous mass of roots. Large woody roots like these are good at storing sugars but poor at gathering water. This is why members of the walnut family should be watered until fully established. Plant your trees in deep holes that generously accommodate the taproot, reversing soil layers as described earlier. (See *Planting Your Tree*, p. 12.) A good mulch is important, as this will prevent evaporation from the surface, helping to hold water in the soil around the tree. Soil that is allowed to dry out will often crack along a line with the taproot, shrinking back from the root as it dries. If the soil shrinks back even 1–2 millimeters from the taproot, your tree will die. This often happens in mid and late summer.

Shagbark hickory trees are similar in every way to black walnut except that they grow very slowly and have even longer taproots.

Bur oak differs from the above in that it begins growth slowly but rapidly increases in size once established. On the whole, its growth rate falls somewhere between that of walnut and hickory. Like the walnut family, it is deeply taprooted, with a unique tendency to almost corkscrew into the ground.

Northern red oak is a medium to fast grower. Although it sends down a taproot, its deep roots also spread laterally. It is sensitive to soil compaction.

Black walnuts, butternuts, buartrnuts, oaks, and shagbark hickories can be planted 20 feet apart, or even closer initially, but should eventually be thinned to a 40-foot spacing. Deer will browse young trees, so protection is warranted if damage is noted. (See “Plant Pro-tec” deer repellent, p. 27.) Often, young seedlings will grow best where a few sparse older trees exist, as long as you plan to cut the older trees before the nut trees are mature.

American chestnuts prefer moderately acid (pH 4.5–6.5) sandy loam soil and sunshine and require a well-drained location. For maximum protection from frost, plant on high ground on sloping land. Avoid known frost pockets, wet spots, and limestone-based or heavy clay soil. American chestnuts will mature to be 80+ feet tall with a spreading crown. They should be spaced at least 20 feet apart, and more than one is required within 200 feet for pollination. Protect with hardware-cloth screen and deer fence.

Korean nut pines are very slow growing. They like well-drained sandy or gravelly loam on the acid side and will not grow in a wet spot. At maturity, they will thrive in full sun, but as young seedlings they require moderate shade. Although they can tolerate some drought once established, they grow best in a cool, moist climate and do not enjoy heat. Korean nut pines are self-fertile, but will yield many more nuts when more than one tree is present.

Hazelberts differ markedly from walnuts, hickories, and oaks in their growth habit and soil requirements. They may be strongly taprooted or have no taproot at all. Like fruit trees, they prefer a sandy loam with a pH of 6.5–7.0. They will establish best in a hole that generously accommodates the root system. To encourage the hazelbert to take its natural form as a bush, plant the root collar (where stem meets roots) just below the soil level. The plant will then sucker, producing many stems and resulting in a highly productive, dense bush. Mulch young plants and water them regularly. Hazelberts planted on a 3- to 5-foot spacing will fill out to make a wonderful dense hedge. Their fall foliage is quite beautiful, turning from deep green to a mixture of reds, oranges, greens, and yellows. Since their pollen is heavy and they rely primarily on wind for pollination, hazelberts should be planted no further than 8–12 feet apart.



A hazelbert hedge provides good shielding, even in winter.