



# PHILADELPHIA ORCHARD PROJECT



# PRUNING GUIDE



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**Pruning** is the regulation of plant growth and productivity through branch removal and training.

Most common fruit trees need to be pruned every year of their life for best health and production. Good annual pruning can help reduce pests and disease and bear a larger, more consistent, and better quality harvest. Not all plants require pruning to produce fruit, and some branches die naturally due to weather, insufficient light, insects and diseases.

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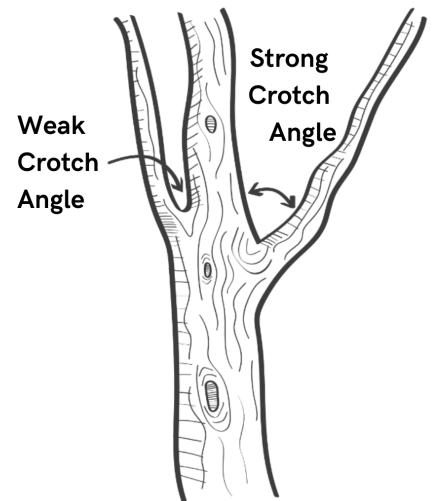


## WHY PRUNE FRUIT TREES?

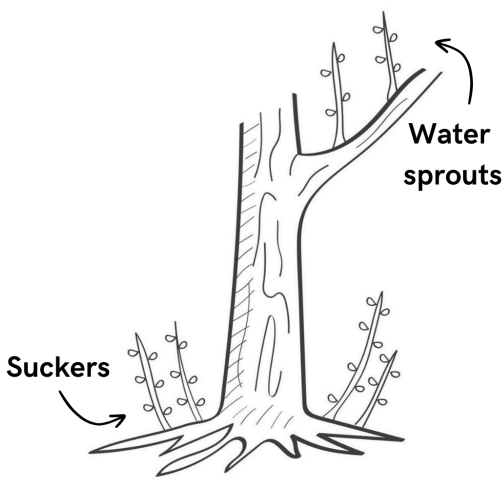
1. Removing dead and diseased wood helps prevent infection and the spread of disease.
2. Pruning can improve both the quantity, quality, and consistency of the harvest. The interior of unpruned trees tends to be too shady for good production. Some trees may also demonstrate alternate-bearing: a large, low quality harvest one year followed by a very small harvest the next.

3. Good shaping works with a plant's natural growth habit to develop a strong primary structure that is able to support the full weight of harvests.

4. Encouraging good branch angles can prevent them from breaking in a storm or under the weight of fruit, which can tear deep into the trunk and endanger the whole tree. A narrow crotch angle is weak; at 17 degrees or less the bark gets pinched between the branch and trunk, eventually pushing apart and causing breakage. A crotch angle between 45 and 60 degrees is ideal and better able to bear the weight of fruit.



5. Shorter trees and lower fruit growth make for easier harvesting. An unpruned tree may bear most of its fruit out of reach or grow to be too large for the space.



6. Pruning maximizes fruit production and health by controlling vegetative growth. Suckers, water sprouts, and vertical branches drain a tree's energy and shade out productive horizontal branches. Water sprouts grow vigorously upright on a branch, often in reaction to pruning. Suckers grow from below the graft union and are an extension of the root stock.

7. Sunlight to the interior of the tree is essential for flower bud formation and fruit ripening and helps dry out the tree to reduce fungal diseases.

8. Increased air circulation to the interior reduces development of fungal diseases and may lessen some pest populations.

## KNOW YOUR PLANT

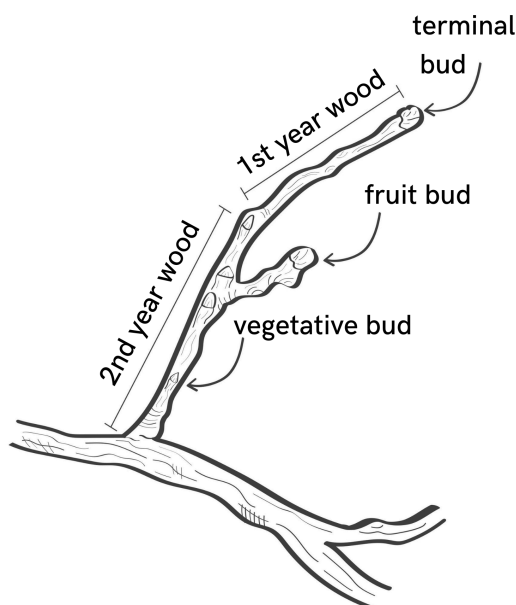
How, when, and what to prune will depend on what type of tree you are working with. Be familiar with your tree's natural growth habit (upright, pyramidal, spreading, multi-stemmed, vigorous, etc) and choose the tree form best suited to the plant's natural growth tendencies. Also learn about its fruiting habit. Mistakenly pruning fruiting wood or specialized fruiting structures can seriously compromise a tree's ability to bear fruit.

### Bud Types

**Vegetative buds:** Produce leaves or branches with leaves. They tend to be more slender, pointed and tightly clasped to the branch. With some exceptions, most buds on first year wood are vegetative buds, but they are also found on older wood.

**Fruit buds:** Produce flowers first, and if all goes well, then fruit. They are generally more plump, round, and extend away from the branch. Fruit buds can mostly be found on 2 year old and older wood, primarily on lateral branches. However, peaches, nectarines and almonds fruit primarily on 1st year wood. Apricots, sweet cherries, and Japanese plums sometimes fruit towards the base of 1st year wood, but usually on older wood.

**Terminal buds:** Also known as the apical bud, are located at the tip of a branch.



### Wood Types

**1st year wood:** Wood that grew last season. It usually has smoother bark and a brighter color than the rest of the wood. With some exceptions (see above), buds on 1st year wood are mostly vegetative buds. Heading cuts should only be made on 1st year wood. You can see where 1st year wood ends and 2nd year wood begins by a series of tight rings on the branch.

**2nd year wood:** Wood that grew two seasons ago. It is usually a more dull color than younger wood. The buds on 2nd year wood can be fruit and/or vegetative buds.

**3rd+ year wood:** Wood older than 2 seasons may have fruiting buds depending on the species.

## WHEN TO PRUNE

**Emergency** pruning of dead, damaged and diseased wood, should be done promptly, no matter what time of year. Root suckers and watersprouts may also be removed in late spring to early summer.

**Primary** annual pruning should be done during the dormant season, before buds begin to swell, and preferably on a day when the temperature is above freezing (mid January through mid March).

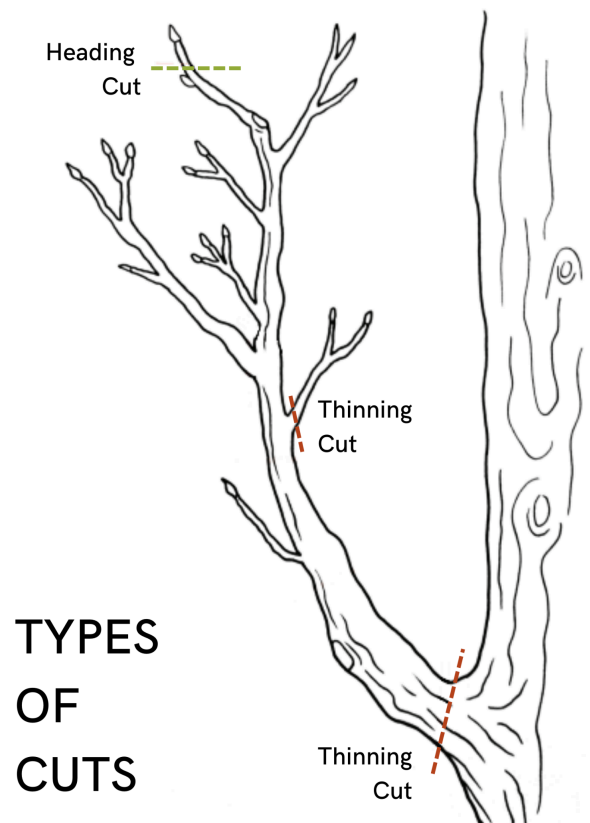
**Some exceptions** include: Peaches should ideally be pruned during or right after they bloom. Apples, pears, grapes can be pruned earlier, starting in late December.

## PRUNING METHODS

**Thinning Cuts:** Used to thin out the tree by removing growth with the goal of little to no regrowth, by cutting branches back to their point of origin. Allows more light and air into the interior by thinning out crowded, crossing, or competing branches. Also used to eliminate dead, diseased, or damaged wood. Cut just outside the branch collar to a side branch or central leader. Thinning cuts are the majority of cuts made in annual winter pruning and the goal is for all branches to have their own air and light.

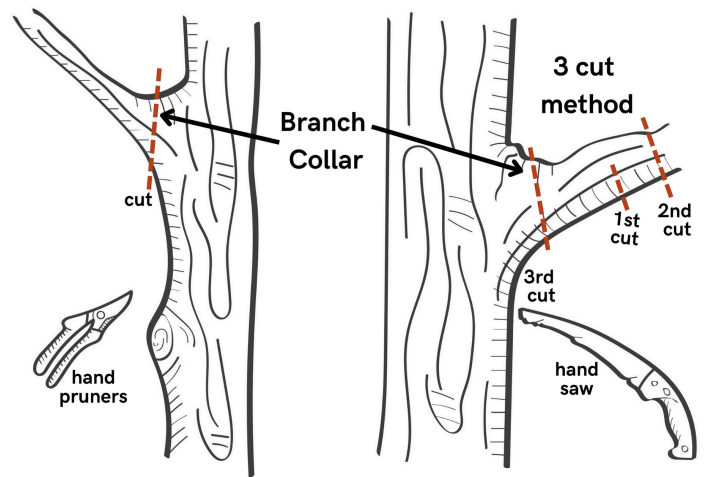
**Heading Cuts:** Used to induce growth by cutting back to a vegetative bud. Heading cuts are most often used when there is long growth with no side branching. The effect of a heading cut is: the top vegetative bud grows out in the direction it is pointing; the next 2-3 buds down the branch will break dormancy and form lateral branches; the entire branch will thicken in caliper creating a stronger structure to hold the weight of fruit. Heading cuts also help induce the formation of more fruiting buds. Make heading cuts on first year wood (wood that grew last season) to a vegetative bud pointing in the direction you want the branch to grow (away from the trunk).

Make the cut  $\frac{1}{4}$ " above the bud at a 45-degree angle sloping away from the bud. A general rule of thumb when making a heading cut is to remove approximately one third of last season's growth on a branch.



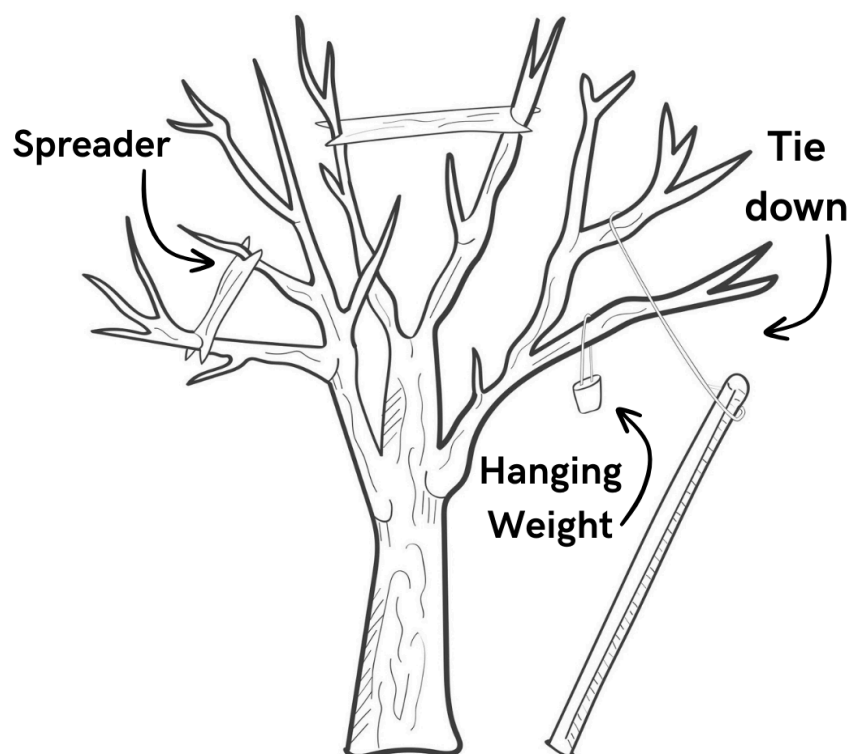
## MAKING THE CUT

1. Use hand or pole pruners to make cuts less than 1" thick. Hand or pole loppers can be used for cuts 1" to 2" thick. Use a handsaw or pole saw when removing branches thicker than 2".
2. Make thinning cuts just outside the branch collar. The branch collar looks like a swollen ring at the base of a branch where it connects to another branch. Never cut into the branch collar, as this reduces the ability of the tree to heal over the pruning wound.
3. Don't leave a stub. If more than 1/8" of wood is left outside the branch collar or above a bud, the wound takes much longer to heal, because the healing tissue of the branch collar must grow out over that extra wood. This increases the risk of attack by insects and diseases.
4. Always make a flat cut. Do not try to sculpt the cut to the contours of the branch collar as you may accidentally damage the branch collar tissue.
5. When removing a large branch, use the 3 cut method to reduce risk of a pruning cut ripping from the weight and causing further damage. Start with an undercut 6-12" outside the branch collar, sawing from the bottom of the branch to at least a quarter way through. Make your second cut further out the branch, cutting all the way through to remove the bulk of the branch. Make your third cut just outside the branch collar.



## TRAINING METHODS

**Spreading:** Used to train a branch to a more favorable position to create stronger crotch angles, induce fruiting, and/or create more space between branches. Branches younger than 18 months are best suited for training as they are usually supple enough to move without breaking. To manipulate the branch you can tie the branch down to a stake (placed at a 45-degree angle away from the tree); use a spreader between two branches or between a branch and the trunk; use a hanging weight such as molded concrete or water jugs (risk of breakage from wind).



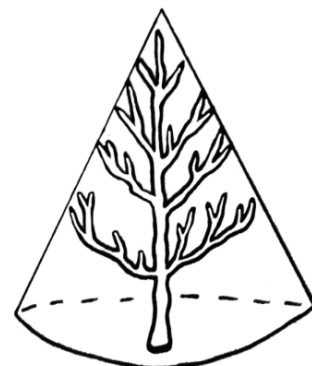
Spreading is most commonly done in late winter or spring. After several months the tree will hold the position, and spreaders should be removed by mid summer.

# TREE FORMS

Patterns to guide pruning that ensure sunlight and airflow throughout the whole tree. Different trees are paired with different tree forms based on the natural growth habit. Note: some trees are adaptable to multiple forms.

## Central Leader: Apples, Asian and European Pears, European Plums

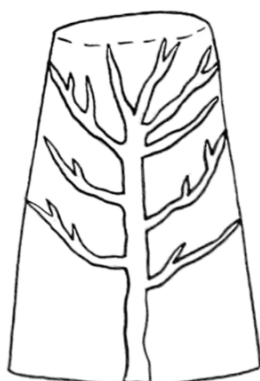
The central leader method is for trees with a strong vertical growth habit. In this form, sunlight and airflow reach the center of the trees through the sides of the tree. The form is shaped by tiers (whorls of branches), each consisting of 3-5 branches spaced evenly around the trunk. Each tier is followed by a skip, 2-3' where no branches are allowed to grow off the trunk/central leader.



Tier #1: 2-3' above ground

Tier #2: 5-6' above ground

Tier #3: 8-9' above ground

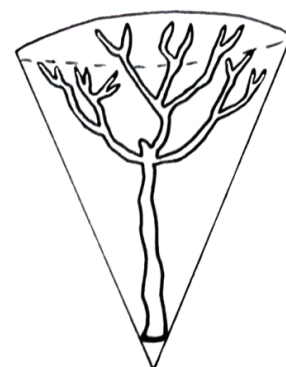


## Modified Central Leader: Sweet Cherries, Pears, Apples, Persimmons

The modified central leader is an alternate method for trees with a strong vertical growth habit. 5-6 branches are left spiraling evenly up the trunk, 8-12" apart, but the trunk is cut back to a main branch at 5-8', and treated like a vase or open-center form from that point.

## Vase or Open-Center: Peaches, Pie Cherries, Asian Plums, Hardy Almonds

Vase or open-center is used for trees with a spreading, vase-shaped growth habit. A whorl of 3-5 branches is left within 2-3' above ground; any main trunk is cut back to the topmost branch, creating a bowl shape where sunlight reaches all branches through the middle.



**\*Trees that generally only require minimal pruning:**



# TREE PRUNING BASICS

## PRUNING PRIORITIES

1. Remove any dead, damaged, or diseased wood.
2. Make your big cuts first. Use thinning cuts to articulate the desired tree form: Define the tiers, clear the skips or spaces between major branches, and/or clear the bowl of the open center.
3. Address the 3 C's — Crowded, Crossing, and Competing branches. Use thinning cuts to increase light to the interior and improve air circulation.
4. Train branches to have stronger crotch angles and better spacing.
5. Stimulate growth of side branches where fruiting is desired by making heading cuts.

## PRUNING DON'TS

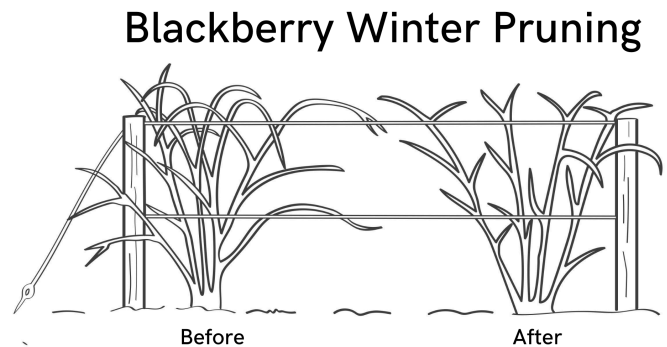
1. **Prune too aggressively:** Whenever possible, avoid removing more than 30% of living wood in one growing season or there will be a flush of weaker vegetative growth as the tree tries to restore its former size and food-producing capacity.
2. **Shearing:** One of the worst things you can do to a fruit tree is to remove a set length from all of the outer growth, in which cuts fall randomly above and below buds. Every cut should be made to a specific point of origin, side branch, or bud. Don't leave stub cuts. Shearing is for hedges only.
3. **Fall Pruning:** Don't prune in fall if it can be avoided. New succulent growth induced by pruning is likely to become damaged by freezing temperatures.
4. **Dressing the Pruning Wound:** Don't apply anything to the pruning wound. Dressing only interferes with the plant's ability to heal.
5. **Don't be afraid to try!** It's the only way to learn. As long as you are following the basic principles of pruning, you will be benefiting your tree with increased health and productivity. You can refine your approach over time by seeing the results and by observing other skilled pruners in person or online.

# BERRY PRUNING GUIDE

## Brambles (cane-bearing shrubs)

The canes of brambles only live for two seasons, making their pruning different from other berries.

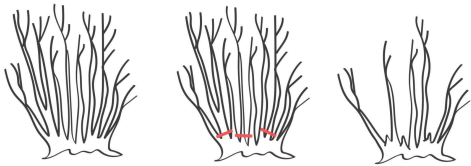
**Blackberries (Rubus):** In summer, pinch out tips of new canes when they reach 3' to 4' height to stimulate growth of laterals. In winter, remove all 2<sup>nd</sup> year canes and thin out to 8 or 10 strongest new canes. Shorten canes to 7' and laterals to 15".



**Raspberries (Rubus):** Remove all canes after 2<sup>nd</sup> year. Thin out weak or crowded 1<sup>st</sup> year canes. For “everbearing” varieties, shorten remaining canes to below previous fruiting.

## Multi-Stemmed Shrubs (all other berry bushes)

Use thinning cuts for a less bushy effect. This increases light and air circulation to the interior of the plant. Remove stems that are more than 4 years old - identified by thicker width and dull gray cracking bark. Older stems are less productive, and pruning renews the plant with young vigorous growth. When pruning, cut stems to 1-2" above the crown of the plant.



**Note:** never remove more than 30% of living wood in one growing season or there will be a flush of vegetative growth as the plant tries to restore its former size and food-producing capacity.

**Blueberry (Vaccinium):** Cut back stems older than 4 years.

**Currant/Gooseberry (Ribes):** Remove shoots after their 3<sup>rd</sup> year. Remove all but 6 new stems.

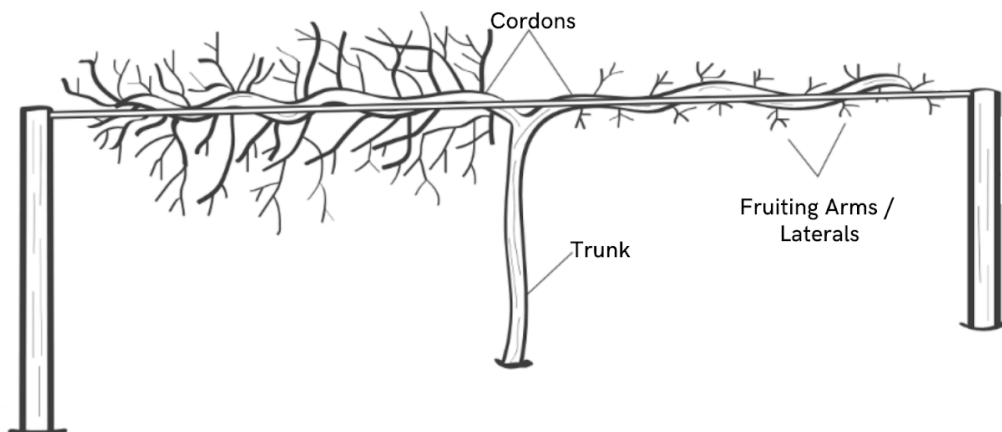
**Elderberry (Sambucus):** Cut out wood older than 3 years and thin new suckers.

**Goumi (Elaeagnus):** Minimal pruning needed.

# FRUITING VINE PRUNING GUIDE

## Grapes:

1. Prune out any diseased or dead wood.
2. Vines store their energy in their roots and fruit on new wood. So we prune very heavily, up to 90% of the previous season's growth, to encourage vigorous regrowth and hopefully more fruit production.
3. Start by identifying what will remain and prune the rest off.
4. There are many different growing systems but here is simple one we use often:
  - a. Create a single trunk and 2-4 semi-permanent side arms called cordons.
  - b. Coming off the cordons we have fruiting arms. We often thin them so they are approximately 6" apart and 2-3 buds long. Aim to retain the fruiting arms that are healthier and thicker in growth.
5. Need to be trained to a structure - most commonly an overhead arbor, set of horizontal wires, or existing sturdy fence.



## Hardy Kiwis (Actinidia):

1. Regardless of the structure they are growing on, kiwi vines should be pruned initially to a single trunk and trained straight up by tying to a post (no twining!).
2. At the appropriate height for the structure, the vine should then be pruned into two permanent cordons (main branches) in opposite directions.
3. Thin out laterals growing from the cordon to 12" apart.
4. Additional summer pruning is needed to keep these vigorous vines under control.
5. Need to be trained to a structure - overhead arbor, set of horizontal wires, or overhead t-trellis system.

**Maypops (Passiflora):** Maypops/passionflowers are herbaceous vines and can be pruned to the ground in winter.



# ABOUT

This Orchard Pruning Guide was developed by the Philadelphia Orchard Project.

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**Questions? Comments?**

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