

Berry Notes

Prepared by the University of Massachusetts Fruit Team

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UPCOMING MEETINGS

MESSAGE FROM THE EDITOR:

Focus on pruning. This issue of Berry Notes focuses on pruning of berry crops. This is an important practice that should be carried out thoroughly every year. Doing a good job with pruning leads to healthy, balanced and productive plants.

Freeze Damage Assessment: As mentioned last month, a concern each winter in our region is whether or not perennial plants have suffered winter injury, either from severe cold or from drastically fluctuating temperatures. Knowing how to assess winter injury is an important skill and can guide some pruning decisions. This issue of Berry notes contains some information on what the critical temperatures are in some of our berry crops and how to go about determining if damage has occurred. More information on this topic will be in the March issue of Berry Notes.

The 2008-2009 New England Small Fruit Pest Management Guides will be available for purchase through the New England Vegetable & Berry Grower's Association and State Extension offices by early April. It contains updated label information and pest management recommendations for Strawberries, Blueberries, Raspberries, Currants & Gooseberries, and Grapes. Pricing information has not yet been finalized but will be announced soon via this newsletter and on the UMass Extension Fruitadvisor website at www.umass.edu/fruitadvisor.

Thanks again to Nourse Farms of Whately Massachusetts for their continued support in underwriting Massachusetts Berry Notes. This is an important partnership which makes this newsletter affordable for all growers.

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STRAWBERRY

Winter Freeze Injury to Strawberry Crowns

Sonia Schloemann, UMass Extension

Strawberries are susceptible to winter injury in two primary ways. The first is damage to roots from the heaving of soil that can result from cycles of freezing and thawing in the spring. This heaving action can snap roots and lead to problems with root infections in the wounded tissue. The other way in which strawberries can suffer damage in the winter is from freezing of crown tissue.

The strawberry crown is actually a compressed stem structure with layers of vascular tissue that forms a cylinder with vascular tissue running spirally in two directions. (See Fig. 1.) Inside this lignified or woody vascular tissue is a fleshy pith that can easily be injured and turned brown by the formation of ice crystals at low temperatures. The critical temperatures will vary with the

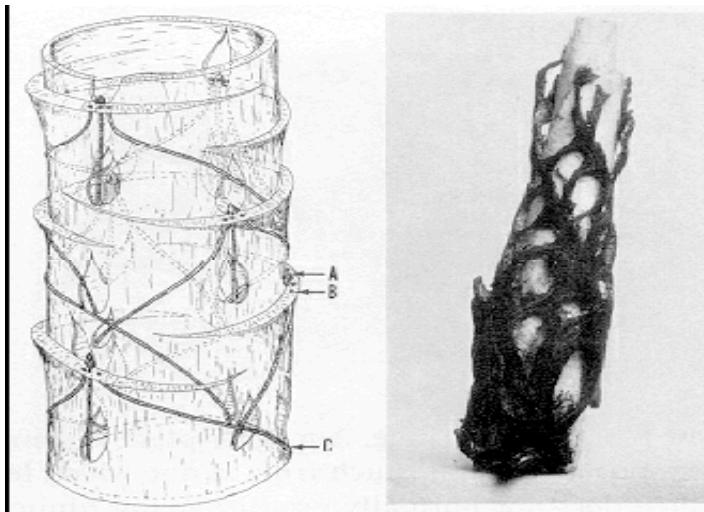
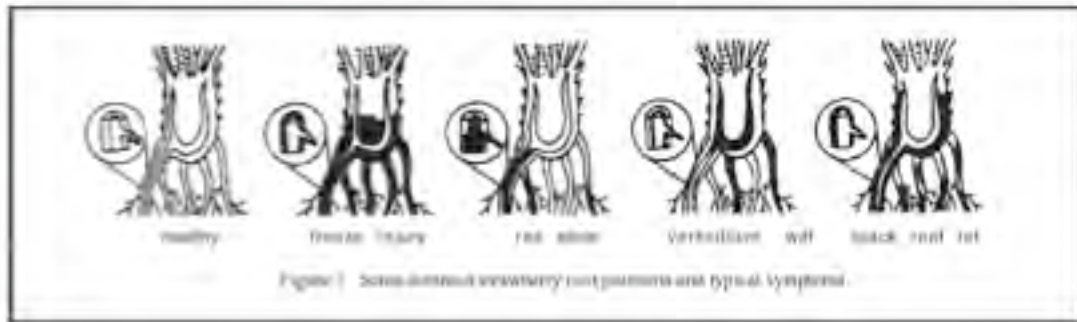


Figure 1. Morphology of the strawberry crown. (from G.M. Darrow, *The Strawberry: History, Breeding and Physiology*; <http://www.nal.usda.gov/pgdic/Strawberry/darpubs.htm>)

Freezing injury is easily seen by cutting the crowns length wise and looking for damaged tissue. (Be aware that if left exposed to air for a while, this tissue will oxidize and turn brown like an apple when it is cut open.). Uninjured pith at the center is a creamy white when first cut. With slight injury to the crown, but not measurable in its effect on the plant, browning of the lower part of the pith occurs.

Moderate injury, seen as a deeper browning, will result in noticeable damage to the plant (i.e., general weakening, slow growth, fewer blossoms and reduced yield), Lethal injury, where vascular tissue has been killed, will exhibit deep browning and blackening of the outer cambium and result in plant death.

If you suspect winter damage in your strawberry field, go out and cut some crowns a week or two after the ground has thawed. If a high percentage of crowns show severe injury, it may be necessary to plow the



variety of strawberry.

Most of our Northern varieties can withstand crown temperatures of between 10 to 14°F. This is why mulching for winter protection is so important for this crop. At these temperatures, not only is the pith damaged, predisposing the tissue to infection by various pathogens, but the vascular function of the outer layer of cambium tissue can prevent normal transport of water and nutrients in the plant.

field down and enter into a rotation cycle for a few years. This will help purge the soil of high levels of pathogens that may build up on the decaying strawberry crowns. Low levels of damage can be nursed through to better health by judicious irrigation, fertilization and other practices to keep plant stress low. See figures 2 and 3 below for help determining if your plants have winter injury or some other type of crown/root damage. (Reprinted from *Mass Berry Notes*, February 15, 2006 Vol. 18, No. 2)

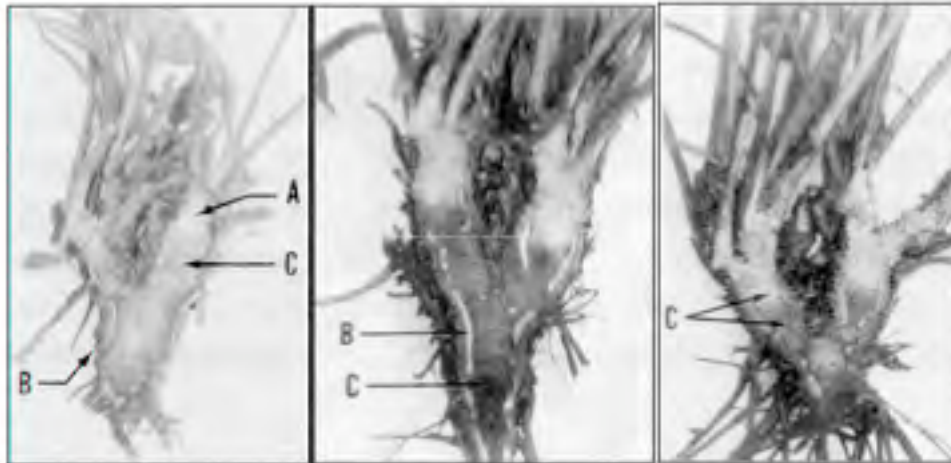


Fig 3. Cold injury to strawberry crowns. Uninjured crowns would have white centers at A. 1. The most serious injury occurs when the cambium that carries sap and food is killed. Slight recovery is shown by new cambium in 1 and 3 at B. Plant 2 would not have recovered. The darkening of the centers of the crowns (C) is caused by the formation of frost crystals that break through the cell walls and oxidation follows, as in the browning of sliced apples. (from G.M. Darrow, *The Strawberry: History, Breeding and Physiology*; <http://www.nal.usda.gov/pgdic/Strawberry/darpubs.htm>)

RASPBERRY

Pruning Summer- and Fall-Bearing Raspberries

Marvin Pritts, Cornell University

Plant growth can be manipulated by growers to achieve long-term increases in production of quality fruit. Pruning affects plant growth rate, fruit quantity and size, soluble solids (sugars), disease susceptibility, ease of harvest, and spraying efficiency. Brambles respond significantly to pruning, but these practices are usually the most expensive and time-consuming part of an operation. Growers must use care when choosing pruning strategies. The following discussion presents different types of pruning methods for primocane fruiting and floricanes fruiting brambles that best promote high yields of high quality fruit.

Primocane-Fruiting (fall-bearing) Raspberries

Primocane-fruiting raspberries produce fruit at the top of first-year canes in late summer. If allowed to overwinter, these same canes will produce fruit again in early summer of the second year. However, the quality of this early summer fruit is inferior to both the late summer primocane crop and summer crops of floricanes fruiting types. Also, harvesting the early summer second-year crop is difficult because of interference from new primocanes. Likewise, harvesting the late summer primocane crop is difficult because the primocanes are thinner and taller when the second-year canes are allowed to grow, too. Most growers sacrifice the early summer second-year crop in favor of a smaller, but higher quality late summer primocane crop. The smaller yield of a single late summer primocane crop is offset by the ease of management.

To prune primocane-fruiting raspberries for a single late season crop, the canes need only be cut to the ground in early spring. New canes will grow each year and fruit in late summer, the canes will be cut early the following spring, and the cycle continues. It is important to cut old canes as close to the ground as possible so that buds will break from below the soil surface. If canes are not cut low enough, fruiting laterals may form on any remaining cane portion. These fruiting laterals are not healthy; they are entry sites for insects and disease pathogens. Also, any fruits that form will most likely rot, attracting pathogens and creating a source of inoculum (disease-conducting material) for the late summer crop. All canes that are cut from the planting should be removed from the area and destroyed. In warm climates, the primocane crop can be delayed by mowing the young primocanes a second time when they are approximately 1 foot tall. Pinching the primocanes (removing the growing tip) in July to stimulate growth of laterals will also delay fruiting. This is sometimes done to delay harvest until after the intense heat of July.

The timing of cane cutting is also important. Carbohydrates move from plant leaves into the crown in autumn, and from the crown to the buds in early spring. If canes are cut before all the carbohydrates reach the crown in autumn, the new canes may not be as vigorous the following year. Canes can also be cut too late, after carbohydrates have moved into the buds. From December through February, most carbohydrates are in the crown, so this is the ideal time to cut canes.

Yield of primocane-fruiting types is influenced mainly by (1) the number of canes per unit area and (2) the number of berries per lateral. Growers can influence the number of canes produced by plants. Since large numbers of canes do not seem to decrease fruit size in the fall crop of primocane-fruiting raspberries, growers should try to produce as many canes per area as possible. This can be done by planting narrow rows and more rows per acre. Row widths of 12-18 inches are considered ideal for harvesting. The distance between rows should be wide enough to allow available equipment to pass. The other factor influencing yield, the number of berries per lateral, generally depends on the particular cultivar being grown. The grower has little control except to choose productive cultivars.

Floricanes-Fruiting (summer-bearing) Raspberries and Blackberries

Floricanes-fruiting brambles produce fruit only from buds on second-year canes. Unlike primocane-fruiting raspberries, these canes must remain intact throughout the winter and following growing season, until the completion of harvest. Also, during second-year flowering and fruiting on floricanes, new first-year primocanes are growing. These primocanes interfere with spraying and harvesting, shade the leaves and laterals of floricanes, and compete for water since they share a single root system. This interference must be minimized to obtain a high yield of fruit each year. Five general methods of pruning floricanes-fruiting brambles are described below. Each method will produce different results in the growth of primocanes and floricanes of floricanes-fruiting crops. Also, with the following methods, row widths should be maintained at no greater than 18 inches.

Conventional: No Mowing or Suppression of Primocanes

This training system is traditionally used by bramble growers in the Northeast. Primocanes emerge and are permitted to grow throughout the season. The following year, they become floricanes, flowering and fruiting as new primocanes. Immediately after fruiting, however, the floricanes are cut at ground level and destroyed. Some carbohydrates are lost by cutting canes in summer.

However, this loss is offset by the advantages of reduced disease inoculum and a reduction in dormant season pruning. In early spring, all remaining canes are topped (headed back) to a convenient height for picking, since little vegetative growth occurs in the second season. Canes are thinned to a desired number, usually 3-4 canes per square foot. When thinning, the most vigorous canes should be selected to produce the next crop - those with good height, a large diameter, and no visible symptoms of disease, insect damage, or winter injury.

Alternate Year Mowing

Primocane interference among floricanes is reduced by alternately mowing half of the planting to the ground each year during the dormant season. In the spring after mowing, primocanes will emerge and grow without interference from fruiting canes. The following year, the floricanes will flower and fruit. Although primocanes will also grow in the fruiting year, all canes will be cut to the ground during the next dormant season. Advantages of this method are that no detailed cane thinning or pruning is required, and spray material costs are reduced approximately 50%. Disadvantages include a reduction in fruit quality, berry size, and yield of approximately 30% for most cultivars, since only half the planting is fruiting in any one year.

Mowing with Primocane Suppression

The reduction in yield caused by alternate year mowing can be recovered over the short-term by removing all primocanes from the plant row during the fruiting year. The elimination of primocanes after they begin growth is called "suppression." After the first few flushes of growth are removed, primocanes eventually will be allowed to grow. A system that involves mowing in one year, followed by primocane suppression in the second year, is truly biennial - primocanes grow without interference from floricanes, and floricanes grow without interference from primocanes.

Removing primocanes, however, is not easy. Dinitrophenol products can no longer be used, so growers must find other ways to remove primocanes until new products are developed. Some growers have reported success with Gramoxone, Scythe and Goal. The advantages of this method are the ease of pruning when done in early spring, and a reduction in spray materials cost. Disadvantages are a reduction in yield over the long-term, since only half the planting is fruiting in any one year, and the cost of primocane suppression (labor, materials).

Primocane Suppression without Mowing

The highest long-term yields and largest berry sizes have resulted from a combination of selective floricanes thinning and suppression of primocanes in late. If primocanes are suppressed when 6-8 inches tall, shading on the lower portions of floricanes is reduced. Harvesting is easier because smaller primocanes cause less interference.

Primocane suppression has also been reported to increase hardiness. Since there is less shading and fewer demands for water, fruit size and productivity of lower laterals are increased. Primocanes of vigorous cultivars can still grow to a sufficient height for adequate fruiting the following year.

Primocanes should not be suppressed until the planting is at least three years old. Primocanes contribute large amounts of carbohydrates to the bramble plant, and repeated suppression will reduce carbohydrate levels. Therefore, suppression should be skipped every third or fourth year to allow the planting to recover from the general reduction in vigor. Weak hills or sections of rows should not be suppressed at all. There are conditions under which suppression of primocanes is not recommended. If a fruit crop load is particularly heavy, primocane growth may

decrease naturally as developing fruit demands all the plant resources. Also, if primocanes are suppressed in regions with short growing seasons, they may be too short at the end of the growing season. Suppression is not recommended under the above conditions, or whenever the plant is stressed, such as from a lack of moisture or a nutritional imbalance.

Advantages of primocane suppression are: (1) increases in fruit size and quality, (2) increases in production, and (3) reduced cane numbers. Disadvantages are: (1) longterm reductions in stand vigor and (2) expenses involved with primocane suppression or elimination.

Partial Primocane Suppression

Yield and quality may be increased without suppressing all the primocanes in a planting. Removing all but 4 or 5 primocanes per linear foot of row will increase yield and fruit quality in floricanes of some cultivars. For this method, growers select the primocanes in late spring which will be carried into the following year for fruiting. Rejected primocanes are cut to ground level

when 8 inches tall. The raspberry plant uses resources for the current fruiting canes and the remaining primocanes, rather than for many primocanes which would eventually be removed. Primocane regrowth is ignored until the dormant season when these short canes are removed. Advantages of this system are: (1) selected primocanes grow for an entire season instead of the partial season permitted in complete primocane suppression, (2) rejected primocanes are removed when small, succulent, and easy to handle, as opposed to large and thorny, and (3) fruit size and quantity of current season is increased. The major disadvantages are: (1) primocane selection is difficult when leaves are on the plant, and (2) suppression of undesirable canes requires much labor. (*Source: New York Berry News, Vol. 3, No.2, Feb. 2004*)

Pruning Black, Red and Purple Raspberries and Blackberries

Ray R. Rothenberger, University of Missouri – Columbia

Raspberries produce fruit on 2-year-old canes, which die after the crop has matured. The pruning of black and purple raspberries consists of:

1. Tipping the new canes when they reach a height of 18 to 20 inches, thus forming a branched cane that is capable of producing more fruit than an unbranched cane. Branched canes are also more able to support the crop off the ground than unbranched canes.
2. As the buds break in the spring, the branches on the canes should be shortened to 8 to 12 inches (longer if the plant is supported by stakes or a wire trellis).
3. After the crop is harvested, the old fruiting canes should be removed at the soil line. (The removal of the old canes as soon as the crop is harvested is a good disease control practice since it removes an important source of infection.)

Pruning red raspberries

Red raspberries should be allowed to produce long, unbranched canes rather than branched canes like the

black and purple varieties. The new canes are, therefore, unpruned during their first season's growth. At the start of the second season, they are topped to a height that will permit them to support themselves and keep the fruit off the ground. If the plants are supported by stakes or a wire trellis, they can be pruned to permit more fruiting wood. The old

canes die after the crop is matured and they should be removed as early as possible in order to remove sources of disease.

Pruning upright blackberries

Standard American varieties of blackberries are usually able to support themselves without stakes or a trellis. Pruning is similar to that of black and purple raspberries except the canes grow taller. It consists therefore of:

1. Tipping the new canes at a height of 24 to 30 inches to form branched canes.
2. As growth starts, remove all dead and weak canes or branches and head the branches back to a length of 12 to 15 inches or to the degree that the canes can support the expected crop.

3. After the crop is harvested, remove the 2-year-old wood to stimulate the new canes and remove sources of diseases.

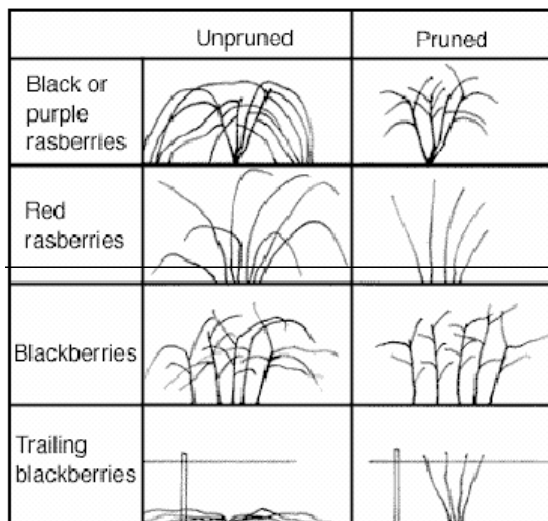


Figure 1. Pruned and unpruned raspberries and blackberries

Pruning trailing blackberries (Dewberries, Boysenberries, etc.)

Trailing blackberries are not grown extensively in Missouri because of a lack of hardiness and their susceptibility to bramble diseases. Like other brambles, they bear fruit primarily on 2-year-old wood. The one-year wood is usually allowed to grow on the ground where it can be mulched for winter protection. As growth starts in the spring, these canes can be lifted up and tied to a trellis or stakes for fruiting. Weak canes should be removed as well as all dead wood and the stronger canes shortened to fit the trellis or stakes (usually 36 to 40 inches high). After the crop is harvested, the old fruiting wood is removed while the new wood is permitted to remain on the ground until the next spring (see Figure 1).

Additional suggestions

1. In tipping the new growth of black and purple raspberries and upright blackberries, each cane should have the growing tip pinched out as it reaches the desired height. If several inches of the cane are removed, the side branches are severely stunted.

2. Trailing blackberries and red raspberries should be supported by stakes or a wire trellis to produce maximum crops. The same is true of black and purple raspberries, especially for the first crop (2-year-old plants). These will support themselves fairly satisfactorily after the second year.

3. All brambles in Missouri are subject to several serious plant diseases that are difficult to control. As a result, the plantings are usually short-lived and require frequent replacement.

4. Upright blackberries are frequently affected with a sterility condition in which the plant blossoms normally but produces no fruit. There is no control for this condition and such plantings should be removed.

5. A thorough spray program will assist in producing satisfactory crops of both raspberries and blackberries. (Source: University of Missouri Ag. publication G6000, <http://muextension.missouri.edu/xplor/agguides/hort/g06000.htm>)

BLUEBERRY

Blueberry Pruning Brush-up – No Pun Intended!

Cathy Heidenreich, Cornell University

Pruning is one of the few small fruit chores commonly occurring at this time of year. It is also the most “hands-on” task associated with blueberry production, other than harvesting or planting. How to get the most bang for your buck in terms of pruning? Take a minute to review key concepts below before you prune. Fine tune your pruning strategy accordingly to maximize efficiency and minimize cost expenditures both now and later in the season.

Why Prune?

Is pruning just another item on your production schedule to be checked off, or do you really take time to consider what you hope to achieve by pruning? This season, re-focus on the reasons why we prune blueberries. Pruning dollars have direct and indirect impacts on fruit dollars for the current season, and over the life of the planting. Below are some of the benefits of pruning:

1. Maintains bush productivity and vigor through elimination of older, less productive canes and rejuvenation of new cane growth.
2. Facilitates harvest by developing appropriate growth habit.

3. Increases air circulation, reducing conditions favorable for disease development.

4. Reduces fruit numbers and opens canopy to sunlight, improving sweetness and fruit size.

5. Removes winter-injured, damaged, insect-infested, or diseased plant parts.



Before You Prune

Get your equipment assembled and ready to go. Sharpen all blades. If you are using pruning guns, be sure equipment is fully operational and carry out any routine maintenance that may be needed.

Decide on a pruning schedule, based on your particular planting(s). What variety or planting will you do first? Does this particular variety need special pruning? Pruning stimulates

vegetative growth. It follows, then, that weaker bushes will benefit from more pruning than vigorous bushes; they may also require detail pruning as opposed to complete cane removal. Special consideration is needed for varieties with spreading habits. In this case you may be tempted to remove all those canes sprawling into alley ways; care must be taken to leave sufficient canes for fruiting.

Is this a young planting you are pruning for training purposes? Is it an older planting that needs to be

rejuvenated? How many canes should be removed from each plant? Are there insect or disease issues that maybe re-dressed through detail pruning? How will brush from prunings be dealt with?

On to the Main Event

In general, prune to an upright growth habit with an open canopy allowing good light penetration. Do this in four easy steps. First, remove any damaged canes, i.e. winter injury, insect or disease damage, or breaks. Second, remove canes that rub against another cane, to

prevent spread of canker diseases. Third, remove older canes and those canes obstructing movement through the alleys. Fourth, remove any short, branched canes within the canopy; fruit on these interior canes generally ripens too late to be harvested. Cut canes to be removed as close to the crown as possible. Avoid leaving stubs which become ideal homes for canker-causing fungi. When branches are removed, make cuts as close as possible to the main cane; avoid leaving short, stubby branches for the same reason.

Plant Stage	Pruning suggestions
1-2 year old plantings	Little pruning required. Promote vegetative growth by rubbing off flower buds in March or April. Alternatively prune off shoot tips where flower buds are located.
3 year old plantings	IF more than 2 new canes were produced previous year, leave the 2 healthiest new canes; remove the remaining new canes.
3-8 year old plantings	Continue light pruning, leaving the 2-3 best new canes from previous season, until plants reach full size. Eight year old plants should have 10-20 canes of various ages.
> 8 year old plantings	Annual removal of 8 year old canes. In general, 20% of older wood (1 out of every 6 canes) may be removed without reducing yield. Berry numbers may be lower but fruit will be larger in compensation.
Plantings needing rejuvenation	Strategy 1: Remove old, unproductive canes, leaving 2 or 3 older canes and all younger canes. IN successive years, remove up to 20% older wood until new cane growth occurs. Keep 2-3 new canes and continue to remove 20% oldest canes. Strategy 2: Cut all canes to ground level (delays harvest 3 years). Thin new canes to most vigorous 6-10 canes. Strategy 3: Summer hedge immediately after harvest; selectively remove dormant canes.

Pruning to reduce disease and insect pressure One of the benefits of pruning referred to above is reducing disease and insect pressure. Disease pressure reduction in blueberries is a one-two punch, when it comes to pruning. Two of the most common blueberry canker diseases, *Fusicoccum* (Figure 1) and *Phomopsis* (Figure 2), overwinter in cankered wood. These fungi are also particularly adept at colonizing dead wood, particularly pruning stubs. Removal of cankered canes and avoiding cane or branch stubs during pruning will reduce the number of new infections occurring during the season. Prune out and burn diseased canes and branches, taking care to remove all infected (brown) tissue below the cankers. Cultural practices (maintaining plant health, minimizing winter injury and

early spring frost damage) and pruning out dead wood are more important in controlling canker diseases that sprays, so now is your chance! Canker disease severity and spread may be further minimized if new cankers are pruned out as they appear during the growing season.

Pruning further reduces disease development by maintaining an appropriate growth habit and opening the canopy. Cane, leaf, and fruit surfaces dry more quickly when good air circulation occurs throughout the canopy/planting,



Figure 6. *Fusicoccum* cankers on cane.



Figure 7. *Phomopsis* canker, sometimes mistaken for winter injury. Inset: Close-up of fungal spore-producing structures on cane surface.

minimizing conditions favorable for disease development. This is true not only for canker diseases, but other blueberry diseases as well.



Figure 3. Bush infected with blueberry crown gall.

A report of another, less common blueberry disease also surfaced this past season, blueberry crown gall (Figures 3 and 4). This disease is a sporadic problem and is not frequently seen in New York plantings. It is caused by the bacterium, *Agrobacterium tumefaciens*,

planting, take some of these precautions during pruning:

- 1) Prune bushes during dry weather,
- 2) Frequently disinfect pruning equipment. A 10% bleach solution or 70% ethyl



Figure 4. Close up of gall on cane. (Pictures courtesy W. Bertram)

alcohol (shellac thinner) solution works for this purpose, and 3) Remove and destroy diseased tissue. Insect pressure may also be reduced through good pruning practices. Scale insect infestations are more frequently found in poorly maintained bushes. Good pruning practices go a long way



Figure 5. Scale insects on blueberry cane.



Figure 6. Scale on young twig. (Pictures courtesy G. Loeb, NYSAES-Cornell)

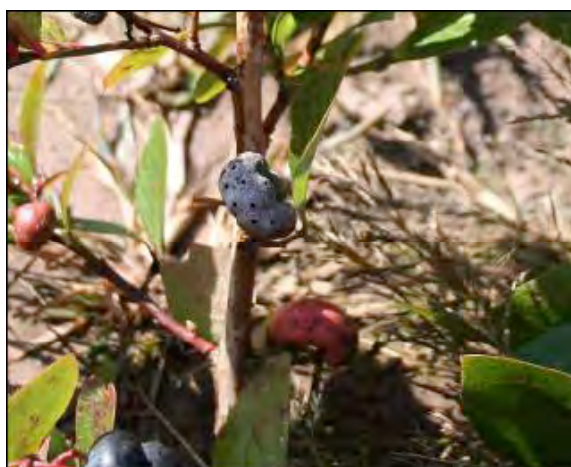


Figure 7. Older stem gall with emergence holes; younger galls to the left and below. (Picture courtesy K. Cox, Cornell-NYAES)



Figure 8. Insect stem gall with overwintering larvae. (Picture courtesy J. Burth, Oswego County CCE)

and may occur in propagation beds and young plantings. It is sometimes found in older plantings as well. If you happen to have this disease in your

toward reducing scale insect problems. Keep an eye out for the hard -covered female insects on small twigs and branches while pruning (Figures 5 and 6). If scales are

present, schedule a dormant oil spray for early spring during bud swell.

Insect stem galls were particularly prevalent on blueberries during the 2006 growing season and several growers reported problems with this insect pest (Figure 7). The tiny wasps overwinter as larvae in the galls (Figure 8). Adult wasps emerge in early June and lay eggs on twigs, causing new galls. Currently there are no products available for control of this insect.

Your only recourse in this instance is to prune out and burn the galls now to reduce your insect stem galls next season. Watch during mid to late June and July for new galls. Prune out and destroy them as they appear. (See a movie on this pest at <http://www.nysaes.cornell.edu/pp/extension/tfabp/movies.htm> .)

Final considerations

Brush removal is an important part of the pruning process. Several options are available depending on the layout of your plantings and available equipment. One method is to chop brush in place using PTO driven equipment such as Bush Hog or a flail mower. Another option may be to push brush out of alleyways and burn, chop, or chip it off site.

Is the job done? Not quite. What remains is to take time next fall and winter to evaluate how well your pruning strategies for the 2007 worked, and determine what needs to be done in 2008 to keep those pruning dollars yielding better blueberries, and returns on your investment.

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(Source: *New York Berry News*, Vol. 5, No. 11, January 2007)

GRAPE

Balance Pruning Grapevines

Mark Chien, Penn State Cooperative Extension

Pruning is not instinctive. When I look at a rose bush or an apple tree in my yard, I panic. We all know that there is a “right” and a “wrong” way to prune a plant – and most of us are pretty sure we will do it wrong. Pruning your vines is something worth learning how to do correctly. While vines are very forgiving, over time, if pruned incorrectly, their shape can be lost and they will become more disease prone and less productive. It's not rocket science, but does require intelligence, creativity and practice. Every vine is different, and you need to know how to shape and mold each vine to its ideal form.



Pruning is the act and art of making cuts to remove living vine parts. But pruning is also an important cultural practice in the long-term maintenance of your vineyard. Some would argue that it is the single most important part of the annual vineyard cycle. It's almost impossible to explain how to prune a vine without actually demonstrating how to do it. Therefore, I'll focus on balanced pruning as a viticultural concept and hope that those who need pruning lessons will attend a workshop.

I would urge every grower to balance prune at least a few vines for every acre of vineyard, if nothing else, just to get an idea of the general vigor of your vines. This information, along with petiole and soil tests, and your own astute observations, can help you plan an effective strategy for managing your vineyard. It will also help you to make critical decisions regarding any future planting you may do.

The objective of balance pruning is to make the major step towards achieving a balanced vine in the coming growing year. A vine in balance is one whose vegetative and reproductive functions are in equilibrium. If you can achieve this utopian vine condition – you will likely harvest ripe fruit and

have a healthy vine that will age gracefully and survive the winter. A vine's size is determined by the sum of all its contributing parts – roots, shoots, and permanent wood. As a matter of convenience, only the new growth can be measured, so the number of nodes left after pruning is correlated to the amount of wood that is removed. For an excellent explanation of vine balance please read Stan Howell's treatise on this subject titled “Grapevine Crop

Control” in the Sept/Oct, 2000 issue of Wine East magazine.

Most of us have wrestled with over-vigorous vines. The reasons why these vines often do not produce high quality fruit are well documented. Fortunately, contemporary viticulture technology in the form of rootstocks, divided trellis systems, deficit irrigation and many other practices allow growers to bring vines into balance in awkward sites. Each winter a vine sheds up to 90 percent of its previous year’s wood. The quality and quantity of what remains is of critical concern to both the vine and the grower. The number of buds that a pruner leaves will directly influence crop load and vine vigor in the coming year. – and thus the quality and quantity of fruit, bud fruitfulness, disease incidence and more. To balance prune a vine is to make an attempt to equate the number of nodes retained at pruning with vine capacity, the goal being to maintain a balance between vegetative growth and fruit production. This idea was first proposed by Nelson Shaulis at Cornell in the 1940’s, and has persisted to this day as a key concept in the production of high quality wine and juice grapes.

The idea has since been refined by disciples of Dr. Shaulis, most notably Richard Smart from Australia. Brian Freeman does a good job of describing balanced pruning as a way of quantifying the intuitive process of an experienced pruner. When standing in front of a big vine, it makes sense to leave more buds to allow the growth of that vine to spread out. Conversely, a wimpy vine will have to be pruned “harder”, i.e., to fewer nodes, in order to stimulate the growth of those shoots. In the classic balanced pruning formula, a set of recommendations is given for specific varieties – but these can be adjusted over time for your vines. For example, for Concord the formula is 30 plus 10. That means for the first pound of pruning weight – the measured amount of one-year old wood you remove from your vine – you should leave 30 nodes/ The “plus 10” refers to the number of nodes you should leave for each additional pound of pruning weights. Numbers are given for many varieties on a 20 + 20 basis. Lider et al recommends 10 + 10 for Chardonnay based on California growing conditions. Because of their relative delicacy, it is suggested that vinifera vines be double pruned – leaving twice the number of necessary nodes on the first pass, and fine tuning once the threat of winter injury and/or frost damage has passed. It’s important that only count be used for pruning decisions.

Spurs typically have basal buds that can produce additional, often non-fruitful shoots. Native and vinifera varieties usually don’t produce many adventitious buds, but some hybrid varieties, like Seyval, are notorious for overproducing. Many growers regularly shoot thin extra shoots between budbreak and bloom.

Richard Smart has formulated his own Golden Rules that provide a guide to achieving a balanced vine. Rule #1 recommends 12 – 16 buds per pound of pruning weight. The second rule is to have four to five shoots from count bud positions per foot of canopy. If you have more than this, you need to thin out excess shoots. He notes that these two

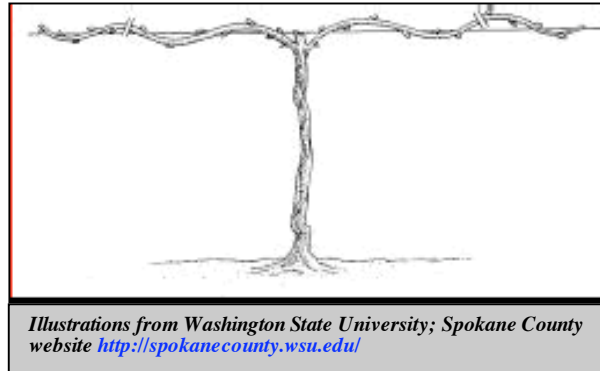
formulas can be in conflict with each other. The trick is to figure out how to get the node number in rule 1 into the space allocated in rule 2. In a vigorous vine situation, this often means dividing the canopy or removing vines to increase the linear part of the equation.

You may wonder what good balance pruning will do for you once your linear vine spacing is already established once the

trellis is in the ground. Good questions. If you are getting node numbers far beyond what your trellis can accommodate (approx. 0.4 lbs/ft), it may be time to consider splitting the canopy, if possible – at the least, take measure to devigorate your vines. If the numbers are low, then you should consider ways to invigorate your vines, or perhaps interplanting. Again, the goal is to achieve balance between the vegetative and reproductive needs of the plant.

There are other important indicators of vine capacity you may wish to use to determine your pruning level. Cane weight and length can be instructive. Smart and Coombe estimate a cane weight for a moderately vigorous vine at 0.75 – 1.5 ounce per cane. Average length would be 15 to 20 nodes. I suppose a person could spend the entire winter taking measurements from vines and a) never find the perfect vine and b) never get around to actually pruning the vines. All of these numbers are pertinent and useful guidelines as you gain your own feeling about the capacity of your vines. In the vineyard I managed we had distinctive areas of similar vine size and would measure vines in each zone and prune accordingly. We might balance prune five vines in an acre just to get an idea if our bud counts were in the ballpark, Please buy a reliable pocket hand scale - you can find one by looking under hanging scales in your favorite search engine (go to fishing scales), a 2 – 3 pound maximum scale is fine, as long as it reads in ounces.

Finally, the inevitable disclaimer. It is impossible to absolutely quantify viticulture into a simple set of numbers and formulas. Your accumulated experience with your vineyard is more valuable than anything you may read here or anywhere else. Use your intuition as a guide. Do not be afraid to experiment with pruning levels, trellis systems,



training systems, canopy management techniques and whatever other tools or concepts are available to the modern grape grower that will enable you to produce the best quality wine grapes possible from your vines. That's the challenge, and the fun part of growing wine. For printed pruning instructions and more details about balanced pruning, please refer to the following excellent reference resources:

1. **Viticulture. Volume 2: Practices.** 1992. B. G. Coombe and P. R. Dry. Winetitles. Adelaide, Australia. ISBN 1875130012

2. **Mid Atlantic Wine Grape Growers Guide.** T. Wolfe and B. Poling. <http://www.ces.ncsu.edu/resources/winegrape/>
3. **Sunlight Into Wine.** 1991. Richard Smart. Winetitles. Adelaide, Australia. ISBN 1875130101
(*Source: PennState Grapevine Newsletter, Fall 2001*)

For an excellent on-line narrated slide presentation of grapevine pruning, go to:

Part I: Grapevine Anatomy and Vine Balance - <http://connect.ag.vt.edu/westover1/>

Part II: Selecting Fruitful Wood and Balance Pruning - <http://connect.ag.vt.edu/westover2/>

Part III: Cold climate pruning strategies - <http://connect.ag.vt.edu/westover3/>

Vineyard Balance Pruning/Cropping Record Sheet - <http://www.vaes.org.vt.edu/AHSMITHJAREC/Pruning-Cropping%20Record%20Sheet.pdf>

CURRENTS AND GOOSEBERRIES

Pruning Gooseberries and Currants

B. C. Strik and A.D. Bratsch, Oregon State University

Prune when the plants are dormant in late winter. Red currants and gooseberries fruit in a different way from black currants, so you should prune them differently.

Red currants and gooseberries

These produce most of their fruit on spurs that are located on 2- and 3-year-old wood. Canes (stems arising from the base of the plant) that are 4 or more years old are no longer productive; remove them when you prune. After pruning, a healthy bush should have 9 to 12 main canes--3 to 4 each of 1-, 2-, and 3-year-old canes. Remove all canes older than 3 years and canes that are damaged or diseased. Prune to form an open center and remove canes that are low to the ground.

After planting, a yearly pruning schedule would look like this:

Year 1. At the end of the planting year, remove all but 6 to 8 of the most vigorous canes during the dormant period. Make your pruning cuts as close to the ground as possible.

Year 2. At the end of the second season, leave 4 or 5 new 1-year-old canes, and keep 3 or 4 of the 2-year-old canes.

Year 3. Keep 3 to 4 canes each from 1-, 2-, and 3-year old growth.

Year 4. At the end of the fourth and following years, remove the oldest canes and keep 3 to 4 new 1-year-old canes to replace the older canes you removed.

Black currants

Black currants produce best on 1-year-old wood. Strong 1-year-old shoots and 2- or 3-year-old canes that have an abundance of strong 1-year-old shoots are the most productive.

When you prune, keep a total of 10 to 12 canes per mature bush -about half should be 1-year-old shoots. You can leave a few more shoots if the plant vigor is very high. Remove all shoots that are more than 3 years old. Make your pruning cuts close to the ground.

Because black currants bear most of their fruit on 1-year-old wood, you can prune them to produce on alternate years. In this system, prune plants to the ground during the dormant period. This causes the plant to produce many new shoots; no fruit will be produced the season after pruning. Don't prune the plants in the next dormant period, other than removing diseased wood or weak growth.

The following year, they fruit on the 1-year-old wood. Prune your plants to the ground again the following dormant period, repeating the cycle. In this system you get fruit produced every other year on a particular plant. To get fruit each year, you can have half your plants fruiting in one year and the other half the next.

If you're growing black currants in a hedgerow, it's simplest to follow the alternate-year pruning method. Training to a trellis. Currants and gooseberries can be grown as a fan-shaped bush on a trellis. Plants trained this way look

attractive and produce a good crop of well colored fruit. To train to this system, plant rooted cuttings along a trellis with 3 to 5 wires. Space single plants at 3 to 4 feet. Tie side branches to the wires as they develop. To develop a narrow fruiting wall, use the pruning techniques mentioned for the type of currant or

gooseberry you're growing. This system requires a lot of labor and patience—only gardeners with a lot of experience should try it! (**Source:** *Oregon State University Home Horticulture Publication EC 1361*, online at <http://extension.oregonstate.edu/catalog/html/ec/ec1361/>)

Upcoming Meetings:

- Feb. 25, 2008. **VT Vegetable & Berry Growers Association Annual Meeting**, Capital Plaza Hotel and Conference Center, 100 State Street, Montpelier Vt. For more info contact Doug Johnstone at 802-793-2547 or dougjohnstone@state.vt.us.
- Feb. 28, 2008. **The 2008 Hudson Valley Fruit Grower School - Berry Session**, Holiday Inn, Kingston, NY. Tree Fruit sessions will take place on February 26th & 27th. There will be a Trade Show on the evening of the 26th. Information will be made available at our web site (<http://hudsonvf.cce.cornell.edu/calendar.html#fruitschool>), or contact Steve McKay for more information.
- March 1, 2008. **The Northeast Organic Farming Association of New Hampshire's 6th Annual Winter Conference**, Winnisquam Regional High School, 433 W. Main St in Tilton, New Hampshire. For more info contact Anne Nason, Conference Coordinator, e-mail: anason@tds.net or nofanhwc@operamail.com, or call 603-493-1919.
- March 8, 2008. **NH Vegetable & Berry Growers' Annual Meeting**. Alan's Resturant, Boscawen, NH. Cost \$25-\$30 includes lunch. For more information contact Becky Grube at Becky.Gruge@unh.edu.
- March 8, 2008. **Fuel Your Farm's Future: New technologies and resources to stretch your farm dollar and increase profits**, Bristol Co. Agricultural High School, 135 Center St., Dighton MA Cost: \$15 (includes lunch). Up to 2 pesticide recertification credits offered. For info contact Bristol Conservation District, 508-669-6621, bec.turner@verizon.net OR SEMAP, 508-295-2212 x50, info@semaponline.org, or www.semaponline.org.
- March 18, 2008. **Cornell Soils Workshop: Soil Health & Dynamic Nitrogen Modeling**. Conference Room 102, Mann Library, Cornell Campus, Ithaca, NY. For more information contact Larissa Smith, lls14@cornell.edu or Bob Schindelbeck at rrs3@cornell.edu or see http://nysipm.cornell.edu/press_rel/soil_health_dynamic.pdf.
- March 25, 2008. **Berry Pest Management Workshop**, Jordan Hall NYAES, Geneva NY (or via satellite broadcast at additional locations). 8:30am to 4:30pm. Cost \$25 includes lunch and proceedings. For more information contact Laura McDermott at 518-746-2562 or lgm4@cornell.edu.

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