

GROWER FIELD GUIDE, October 1998

This issue is mostly a repeat of September with a few tweaks for being later in the season. Post harvest pest control measures will be directed at cool weather diseases, (mostly stone fruit) rodents and weeds. I stuck my neck out by commenting on pruning, tough topic without a tree in front of me and a saw in hand, so be gentle in your judgment.

This will be the last edition for this year, expect the next one the first week of March in 1999. It is a challenge trying to cover as much of the pest and disease spectrum as possible a month in advance from behind a desk, but a lot less work the second year because I could update and use most of the material from 1997. I very much appreciate the compliments and encouragement I've received, if I missed a topic or more detail on a specific topic would be useful, give me a call and I'll see what can be done for next year.

Take a little time off, enjoy the winter, I hope to see you at some of the winter meetings.

I have freely copied and adapted information from various Research and Extension personnel and publications plus the experiences of the Fieldstaff at Northwest Wholesale for the information presented in this Grower Field Guide. Any errors in presenting that information are entirely mine, please notify me of any errors so that they will not be repeated.

All material usage information supplied in this bulletin is believed to be in compliance with current labels. It is the responsibility of the grower to insure that use of any material is in compliance with the label on the product in his possession! All material rates in this bulletin are based on dilute applications at 400 gallons per acre unless otherwise noted.

I occasionally refer to articles in back issues. If you do not have the issue, check for it at the nearest NWW warehouse, they have it or can get it for you.

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Meeting Calendar

Some of the winters meeting dates have been set, check for updates regularly at the nearest Northwest Wholesale branch.

Nov. 12-13 Washington Pest Consultants Assn., Yakima Convention Center

Dec 7-9 Washington State Hort. Assn. Meeting. Yakima

Jan. 8 Cherry Institute- Yakima

Jan 14 Compost workshop- Wenatchee

Jan 18 Lake Chelan Hort day

Jan 19 NCW Stone Fruit day- Wenatchee

Jan 21 NCW Pear day - Wenatchee

Jan 28 Columbia Basin Hort day, Quincy?

Feb 4 Okanogan Hort day- Omak

Feb 5 Okanogan Pear & Cherry day- Omak

Feb 11-12-13 Thinning workshops- various areas

Mar 4 Columbia Basin Spring Hort meeting

Mar. 6 Penticton Organic production meeting

Coryneum Blight

Spread and germination of this disease begins with the first cool, wet weather of early fall. Apricots, peaches and nectarines should be covered in early September while the weather is still normally warm and dry. *It is not necessary to wait until the leaves are off the trees as we have commonly done in the past.* The objective is to have a fungicide barrier on the twig *before* the spore arrives, carried by early fall rain. Good coverage of the structure of the tree is important.

Use Nu-Cop 3L @ 2 quarts per acre or Nu-Cop DF or Kocide DF @ 8 - 12 lbs. plus Nufilm 17 @ 1 pt. per acre. Lower rates should be adequate for maintenance in clean orchards, if you had fruit or leaf symptoms this year, use the higher rate.

SuperTel Zinc, Boron and Nitrate can be added if desired as long as the temperature range is correct. See *FALL CHERRY TONIC* below.

Peach Leaf Curl

This is not usually much of a problem east of the Cascades because our weather is normally too cold or too dry for heavy infestations. After a mild and moist winter and early spring, I had a lot of calls early in the growing season asking what to do about Peach Leaf Curl, especially from growers with just a few trees for family use. In nearly all of the instances I found out that a copper application had not been made the previous fall. Use the same timing and rates of copper as for Coryneum Blight. Be sure to add the Nufilm 17 so more of the copper will last into the spring exposure time.

Chemical defoliation, a good idea?

No, not in my opinion. The tree adds to it's winter hardiness with the carbohydrates and other nutrients that it reclaims from the leaves as they senesce. As a grower you have been managing the nutrient level in your trees all summer to maximize the bud strength and reserves for early season fruit growth next year, don't blow it now.

Zinc Sulfate applied at high rates or followed by warm temperatures will accelerate leaf drop by two to three weeks depending on the rate and temperature. To avoid this, wait until daytime temperatures are generally below 80 degrees, then use only the maintenance rate of Zinc Sulfate.

Fall Cherry Tonic??

I used that title because we frequently try to combine more than one objective into a final pass through the orchard with the sprayer.

Coryneum Blight, possible in cherries, but has not been a major concern in my experience. Bacterial Gummosis is the more serious concern and can cause heavy crop and tree loss if ignored. Combining a copper compound with fall nutrients in late September to early October rather than waiting until leaf drop when the weather is colder and water supplies are uncertain, has been very successful.

The application timing is determined by the weather. The daily temperature needs to be cool enough to avoid premature defoliation from the Zinc Sulfate in the nutrient combination, my target is daytime highs of mid 70's or lower following application. Higher elevations can usually start in late September with the lower and warmer areas spraying in mid October. The leaves should remain green and active for about two weeks after the application to adsorb the nutrients effectively. (See chemical defoliation)

Nu-Cop 3L @ ½gallon or Nu-Cop DF or Kocide DF @ 8 - 12 lbs. plus Nufilm 17 @ 1 pt. per acre.

Calcium Nitrate (spray grade) @ 15 to 25 lbs. or Urea @ 8 to 10 lbs. per acre.

B-17 Dry Boric Acid or (Solubor DF) @ 3 to 5 lbs. per acre

SuperTel Zinc @ maintenance rates of 6 to 10 lbs. per acre.

Use enough gallons per acre to insure that the tree structure is thoroughly covered by the copper, don't run any more of the nutrients onto the ground than necessary.

Post Harvest Mildew Control

Post harvest mildew control in cherries is based on reducing the number of cleistothecia that develop and survive to produce mildew spores the following spring. Spore counts from a single trial indicate that a fall Lime-Sulfur is as effective as a combination fall and spring Sulforix in reducing the disease pressure. **Do not combine Lime-Sulfur with the fall nutrient spray described above**, allow 7 to 10 days between applications. I would apply the nutrient first to allow for maximum absorption time. If the leaves fall soon after the Lime-Sulfur it does not matter. The rate is 2 ½ gallons per 100, wet the tree to runoff, 200 to 400 gal. per acre depending on tree size.

Post Harvest Psylla and Rust Mite Control

Any post-harvest Rust Mite or Psylla control that is planned should be applied as soon after harvest as the weather cools to below 80 degrees in the daytime. The Rust Mites are moving under the bud scales at this time of year to overwinter and will be protected until they re-emerge next spring. Fall control of Psylla will be of little value unless the block is isolated. Psylla adults disperse during the winter and reaggregate in the pear orchards next spring, if you are not in an isolated location you will be sharing insects with your neighbor. The most common materials used are Lime-Sulfur (5 – 10 gallons) and Oil, (1–2 gallon) per acre. **Do not mix with the fall nutrient spray**, allow seven to ten days between those applications.

Post Harvest Foliar Nutrients for Apple and Pear

The application timing is determined by the weather. The daily temperature needs to be cool enough to avoid premature defoliation from the Zinc Sulfate in the nutrient combination, cooler areas can usually start in late September with the lower and warmer areas spraying in mid October. The leaves should remain green and active for about two weeks after the application to adsorb the nutrients effectively. (See chemical defoliation)

Zinc and Boron are elements that are in high demand by the tree early in the spring and should be stored in the tree tissue from the preceding season as much as possible, they can't be picked up readily from cold soil. Use this timing to get some Zinc into the tree, don't plan on correcting a major deficiency with a single application, the leaves will drop before much if any of the Zinc can be adsorbed if you use high rates. You can come back in with multiple applications of Tech-Flo Zeta Zinc or Zinc 50 early next year, use the maintenance rate now. Boron is readily adsorbed, any lost to the ground will also easily be picked up by the roots if they are active. Nitrogen aids in the adsorption of the other elements.

SuperTel Zinc @ maintenance rates of 6 to 10 lbs. per acre.

B-17 Dry Boric Acid or (Solubor DF) @ 3 to 5 lbs. per acre

Calcium Nitrate (spray grade) @ 20 -25 lbs. (or Urea @ 6 - 10 lbs.)

Nu-Cop DF @ 4 lbs. per acre if you are in an area that is low in Copper.

Phytophthora (Collar Rot)

Reddish bronze to purple leaf color early in the fall is frequently the first symptom of collar rot that is noticed. Early leaf coloration of a single limb on older trees is not an indication of collar rot but is more likely to be winter damage or a canker.

The disease can occur on stone fruit but is most common on apple or pear trees. Young trees (6 years or less) that uniformly turn bronze early in the fall usually have a problem in the root or crown area of the tree, either from rodent damage or collar rot. A little shovel work will quickly tell you which. Extension bulletin 1497 is available at any NWW warehouse for a description of the disease. Apple trees on MM106, M7a, M26, M9 can all be affected, especially on heavy soils that are kept wet early in the spring or in the fall after the need for heavy irrigation has past.

Ridomil Gold for ground application is best for a fall treatment, Aliette WDG is available for foliar treatments as soon as the trees have some leaf surface next spring. The rate of Ridomil is dependent on formulation, size of the tree and the method of treatment that will be used. Read the label for available options.

Pre Dormant Fertilization

The efficiency of late summer or early fall fertilization depends on the weather being warm enough to keep the trees actively transpiring. Shorter days and cooler daytime temperatures will decrease the rate of transpiration and increase the time that is required to capture the nitrogen you apply from the soil solution. I would expect mid September to be nearly as good as late August, October is probably not much different than a dormant application. As the weather cool and the leaves become inactive, (are not transpiring much) uptake will be poor.

See the August edition for the rates and rationale for early fall fertilization.

Post harvest management

Your fall orchard management determines to a large degree your ability to control rodents, weeds and cutworms into the next season.

Close mowing after harvest hastens the decay of dropped fruit, removing a food source for mouse build up. Don't forget the fruit that has dropped into the tree row, your mechanical brush rake will bring most of it out to where the mower can break them up and hasten decay. Slightly damaged apples keep well under a snow cover, and could provide a lot of food for a mouse population.

When you've completed this, your broadcast mouse bait will penetrate the short ground cover into the runway much easier and there is a lot less protection for the mouse from predators. Removal or thinning of the mature weed cover and leaf mat in the tree row by raking will give you better herbicide performance, without broad leaf weeds to develop on, cutworms will not be a problem next year. It's worth the time and cost.

Mouse control

The short-tailed meadow mouse (*Microtus* spp.) is the name of the rodent most growers refer to as orchard mice or voles. The animal has a stout 1.5 to 2.0 oz. body covered with loose, fairly long gray to black hair, small shiny black eyes, and small fur covered ears. The hairy tail is about 1/3 of the body length.

These mice are very prolific. The female is sexually mature at four weeks, and will produce 8 to 10 litters a year with an average of six young per litter. One breeding pair can produce up to 3000 offspring in eight months, each one consuming its body weight in food daily (think hungry teenagers!).

Orchard mice will make runways on the surface of the ground and through vegetation by repeatedly using the same routes to feed. Runways are very shallow and may range from only a few inches in length to several feet. In dense vegetation grass and weeds will easily cover a runway complex. They also will burrow into the ground, entrance holes are about 1" in diameter.

Orchard mice will only consume bait that they encounter in their runways, to be effective a broadcast application must be preceded by mowing or some other operation that will allow the bait to enter the runway system. If you are baiting by hand you waste anything that is not placed directly in a runway or burrow entrance.

For more detailed identification and monitoring information, consult Extension Service bulletin PNW 154 at any NWW warehouse.

Mouse control materials.

Zinc Phosphide bait may be applied by hand or broadcast. It will control with one feeding. The material does not weather well and should be applied during dry weather for best results. Most of the control will be obtained in the first 3 - 4 days after application. Bait shyness will reduce the effectiveness of Zinc Phosphide bait if it is used more frequently than 3-month intervals.

Rozol Paraffinized Pellets or Ramik Brown are labeled for broadcast treatment only. These materials requires multiple feeding by the mice for control, two applications may be needed for complete control of high populations. In my opinion Rozol resists weathering the best and is a good option when heavy dew, frost or occasional showers are expected.

Rozol Ground spray is labeled for post harvest use only. The active ingredient is the same as the pellet and requires multiple feeding by the mice. Use equipment that will provide high enough pressure and volume to penetrate and thoroughly wet the ground cover, do not apply to a bare weed strip. A single application should provide good control.

Each of these materials is labeled for post harvest only. Be sure to read the labels for proper rates and methods of application.

Gopher control

Pocket gophers are active all year but the activity is much more visible in the fall of the year as the animal works closer to the surface storing supplies for the winter. This is the best time to apply control measures because the shallower tunnels are easier to intercept with a tunnel making baiter or probe with a hand baiter.

Which control method is best (traps, poison bait, gas pellets) will depend on the area to be treated and the population levels.

Extension bulletin EB 1404 includes detailed information on control measures with illustrations, traps, probing methods and tools, and tunnel building machinery is available at all NWW warehouses.

Browsing Animal Repellent

Every year that we have deep snow there are reports of damage to trees by deer. Miller Chemical has developed a Capsaicin based material called HOT SAUCE to apply to bare wood. The rate is 1/4 pint per 100 gallons or water plus 1 gallon of Vapor Gard per acre. Thoroughly cover the portion of the trees that are easily reachable by the deer. The Vapor Gard is important to retain the burning properties of the HOT SAUCE through the winter. The material cost of this mixture would be about \$60 per acre. HOT SAUCE will be available by order this year, it comes in 1/2 gallons (4 acres). Pick up a label from the nearest NWW warehouse for mixing and application details, or call me and I will fax you a label.

Weed control

Weed control in the tree row is much more than cosmetic. There is a measurable benefit to tree growth from the reduced competition for water and nutrients. Mouse populations are lower when there is little or no weed cover for them in the tree row. Cutworm populations apparently need broadleaf weeds for larval development, no weeds, little or no cutworms to worry about.

The most economical time to control weeds, regardless of the material that you choose to use is in the fall before leaf fall or with the leaves raked away up, until the ground is frozen. This application will control the fall germinating annuals that otherwise will require treatment in the spring shortly after petal fall when you have a jillion other things demanding attention. It is always easier and cheaper to prevent a problem than to cure it. (I won't tell you how many times I have had to relearn that!)

The constant factors in safe and effective weed control are calibration, uniform coverage and timely incorporation of the material into the soil. Many of the residual materials used will injure trees if the application rate is higher than the immobilizing ability of the soil and they are carried deep enough into the soil to contact tree roots. Check to be sure your nozzle style and configuration delivers a uniform pattern on the soil surface. Account for the overlap that you will have in the center of the tree row. Don't double the actual rate of applied material in this area by hanging extra nozzles or increasing nozzle size on the end of the boom. Application of residual materials with a hand held nozzle is dangerous, I have seen tree severely damaged with this method of application.

Remove large weeds that prevent uniform spray coverage of the soil surface, the 'shadow' from existing weeds will be where your weed control will fail first next year. Do not spray over the top of a heavy leaf drop, most small germinating annuals will be protected from contact materials, if a windstorm moves the dry leaves before the next good rain your residual material may be gone also. The cleaner the soil surface at the time of application, the more effective the material will be. Organic matter will bind up some of the material before it can get into the soil. If you still have irrigation water available, incorporate the material soon after application with a 2 -3 hour irrigation, this will insure no weather degradation and allow the residual control material to bind close to the soil surface where it is most effective. A long irrigation set will drive the material deeper into the soil resulting in a weaker weed barrier.

There are too many variables in crop, soil, tree size and weed population for me to dare to make a recommendation via this letter. I will attempt to list the more common materials and describe how, when and where they fit best. In all cases read the label carefully for crop and soil limitations.

Tim Smith has produced an *Orchard Weed Susceptibility Chart* for North Central Washington that will help you decide which combination of materials will work best for you. It is available at any NWW warehouse.

Contact materials:

Roundup is a systemic material, labeled for use on all fruit crops, which will kill or seriously injure any green plant that it contacts. Young tree trunks less than 2" in diameter must be shielded from the material. Root sucker contact from a normal weed strip on trees that are 4" or more in diameter seem to have no effect on the tree spray (handgun applications are a different story). Contact with or drift onto a low branch will not materially affect that size tree, but may seriously injure or even kill that limb with the damage showing up the year after the application. Roundup should be part of the fall weed control tank mix whenever there are perennial weeds to be controlled and the tree can tolerate the material or is protected from contact. The best control is achieved when the concentration of Roundup is high, one quart or more per 20 gallons of water and the application gallonage is low, 20 gallons or less per sprayed acre. There is no soil activity, the material degrades quickly with soil contact.

Gramoxone is a non-systemic contact material, labeled for use on all fruit crops. It must be adsorbed by green plant tissue and triggered by sunlight or bright light to damage the plant. Weed seedlings will be well controlled, larger weeds or established perennials will be damaged but begin to regrow in a short period of time. Young trees with soft bark (stone fruit, pears, some apples) can be severely damaged in the first year of planting, protection is recommended until the bark becomes somewhat corky on the surface. Gramoxone works best when the plant is thoroughly wetted, 35 to 50 gallons per sprayed acre, with slow drying and low light conditions. This material should be part of the tank mix where the trees can't tolerate Roundup or all of the weeds to be controlled are all at the seedling stage. There is no soil activity.

Weedar 64 is a brand name for 2-4,D, labeled for use on all fruit crops. It is a systemic material effective only on broad leaf plants, i.e. Canadian thistle, bindweed, fruit trees, etc. This material remains active for a period of time on the ground and will be taken up by the tree if rain or an irrigation follows the application within 4 to 6 days and leaches the it into the root zone. A low (1/3) rate tank mixed with Roundup seems to increase the effect on hard to control weeds such as bindweed, perennial clovers and alfalfa with less risk than Weedar 64 alone at full rate. Young trees may be severely damaged during the summer when transpiration is rapid, there is less risk in the cooler fall weather. The most common use is for dandelion and other broad leaf weed control in the drive middles earlier in the year when these weeds are actively growing.

Residual materials:

Princep (Simazine) is available in liquid (4L), wettable powder (80W), and dry flowable (Caliber 90). It is labeled for Apples, Pears and Sour Cherries only. This is one of the first soil residual materials to be used and is still quite effective on annual broad leaf weeds with limited control of annual grasses at a comparatively low cost. It is best tank mixed at a reduced rate with another material that is highly rated on grasses if they are present. Princep can leach into the root zone and damage trees when used on light soils, do not use on trees that have been in the orchard less than 12 months.

Diuron (Karmex) is available in liquid (4L) and in dry flowable (80 WDG). It is labeled on Apples and Pears that have been in the orchard for more than one year except not for use on full dwarf rootstocks, and labeled on Peaches that are 2 years old if used in combination with another material. This is another one of the first residual materials to be commonly used and is also quite effective against most annual broad leaf weeds with slightly more control of annual grasses and some established perennials. It is best tank mixed at a reduced rate with another material that is highly rated on annual grasses if they are present. Diuron can cause tree damage on light soils, Granny Smith is quite sensitive.

Sinbar is an 80 WP, labeled for us on Apples and Peaches only that are at least 3 years old. Do not use on sandy or gravely soils. It is effective on the annual broad leaf weeds, has some effect on a limited number of established perennials, and does not give good control of Yellow Foxtail or Witchgrass. Tank mix with other materials for control in those areas.

Solicam DF is labeled for use on all fruit crops, but may cause damage on stone fruit, especially if the trees are young or the soil is light or gravelly. Apples and Pears are not affected at label rates. Application may be made to apples after the soil is well settled, all other tree fruits must wait until 18 months after planting. It works fairly well on annual broad leaf weeds, has the most effect on established perennials of any of the more commonly used residual materials, and has good control of annual grasses. Solicam is one of the few materials that will control common Groundsel. It is a good tank mix material for Simazine, Diuron, Sinbar, and Surflan. Rainfall or a light irrigation is needed within 4 weeks of application.

Surflan A.S. is labeled on all fruit crops and may be applied after the first irrigation or rain has settled the soil after planting. Surflan controls weeds by disrupting the growth process during seed germination, it will not control any established weeds and is one of the safest effective materials that we have available. Surflan must be tank mixed with either Roundup or Gramoxone if there are existing weeds that must be controlled. Tank mixing with Simazine, Diuron, Sinbar or Solicam at reduced rates when possible broadens the spectrum of weeds that will be controlled.

Casaron 4G is labeled on Apple, Pear and Cherry. The material is very persistent in the soil, careful calibration is needed to avoid haloing of leaves on the tree the following year. Casaron provides a broad spectrum of weed control in both annual and established perennials when used at the maximum rate. Do not apply in the fall until the soil has cooled, just before the first snowfall is perfect timing. Application on warm soil must have irrigation applied immediately to be effective.

Kerb is labeled on all tree fruits and may be applied the fall after planting in the orchard. The material is degraded quickly in warm soil, apply late in the fall but before the ground freezes or incorporate with irrigation immediately after application. Kerb is most active on the lighter soils, trees are very tolerant of the material. It controls most grasses and some annual broad leaf weeds.

Goal is labeled on all tree fruits for control of annual broad leaf weeds, tank mix with other materials for control of grasses. Goal must be applied after harvest and before bud swell the following spring to avoid possible damage to the foliage, hardened wood is tolerant. There is no age of tree limitation in the label. Goal provides good control of common Groundsel.

Prowl is labeled for non-bearing trees only and may be applied as soon as the ground has been settled. It provides pre-emergence control of most grasses and some broad leaf weeds, it will not control existing weeds, the mode of action is similar to Surflan. Cultivation or tank mixes where appropriate must be used to control existing weed growth.

Soil Fumigation

Fumigation of orchard soils before replanting Pome fruit following Pome fruit or Stone fruit following Stone fruit does not cost, it pays. The positive effects on fruit yield and economic returns can be measured for the life of the planting.

Methyl Bromide in one pound cans is the most convenient for individual sites or small acreage. Treat in the fall as soon as the soil temperature falls below 60 degrees, the tree can be removed later. Spring treatment with Methyl Bromide may delay planting 60 days or more depending on the temperature and moisture content of the soil.

Methyl Bromide in the one pound can will not be manufactured after this year. The recommended storage life is not more than 2 years.

Methyl Bromide is available in 100 lb. and larger cylinders. A measuring device or a pressure regulator is needed to insure the proper rate per tree site. *The cylinders must be filled differently according to the method you want to use, so please specify how you are going to apply the material when you order your supply*

Nemasol must have irrigation water available at the time of treatment. The weed sprayer applies the material while the irrigation system is running. Enough water is applied to drive the material 2.5 to 3 feet into the soil. Trees do not have to be removed prior to treatment.

When working and leveling the ground after either treatment, do not mix soil from untreated areas with the treated planting strip.

For broadcast treatment of large acreage with either Methyl Bromide or Telone C-17, contact a custom applicator to determine what soil preparation must be done and by what date to insure treatment this fall.

More complete information and application instructions are available at all Northwest Wholesale warehouses. Read all label instructions before using.

Soil Sampling

Soil sampling can be done anytime of the year that the ground is not frozen, it is best if it is taken at about the same time of year each time that you do it. If you are planning to replant a block you shouldn't miss the opportunity to incorporate needed nutrients before you put the trees in the ground.

In existing orchards take the sample in the tree row within the drip line of the canopy, not from the drive middle. This will give you a more accurate reading of what is available to the tree.

Sample to a depth of 6" - 8", remove the top 1" - 2" of the sample to avoid contamination by lime granules, etc.

Sample different soil types or areas with different growth patterns separately, the buffering capacities of the soil may differ considerably.

Blend 2 or more sample cores per acre taken from the same soil type and depth in a clean plastic bucket. The soil lab usually wants a pint of the blended sample.

Do not mix samples from various depths, i.e. a 2" - 8" sample with an 18" - 24" sample. The pH values frequently vary dramatically between soil layers, you need that information to correctly analyze your soils.

Do not sample after a recent fertilizer application.

Do not blend samples from different water management blocks, i. e. sprinkler, rill, drip, etc.

Ask for a complete soil test which should include cation exchange capacity (CEC), pH, organic matter (OM), nitrogen, phosphates, sulfates, calcium, magnesium, potassium, sodium, exchangeable hydrogen, boron, iron, manganese, copper, zinc, aluminum, molybdenum, and base saturation point. The cost will be \$45 - \$50 per sample. Testing for Arsenic is a separate procedure and is billed extra.

We have soil sample bags available for your convenience. Result usually come back in two to four weeks.

Basic Pruning for Quality Fruit

I could not resist the opportunity to comment on the pruning practices I have observed over the years and then give you my opinion of some basic pruning considerations. Poor pruning will affect the production level and fruit quality of an orchard for much longer than a poor spray or thinning program.

The number one problem I see is the failure to manage the limb size in the tree. With the possible exception of the bottom lateral, no lateral should exceed 50% to 60% of the diameter of the leader that it is attached to. Likewise, no fruiting branch should exceed 50% to 60% of the diameter of the lateral that it is attached to. Failure to diligently follow this rule results in large, equally sized branches in the top of the tree and at the end of the laterals that are crowded, and when fully leafed out shade the interior and bottom of the tree.

Basic tree structure really does not vary greatly from one variety or type of fruit tree to another. Heavy wood is needed to support crop and fruiting branches, but must be kept to a minimum to avoid shading and loss of production and fruit quality. Peach and Nectarine are more sensitive to shading than Apple and Pear, Apricot and Cherry are moderately sensitive to shading.

When there is large wood in the top of a central leader tree, it is obvious which wood should be removed because the central leader will be retained or renewed by a weaker shoot. When the training style is multi-leader, the interior wood is commonly cut out in the belief that it is the cause of the crowding and shade problem. This is a mistake. The end result of this method of shade removal is a tree with low angle leaders that are prone to sucker production, quickly grow over the drive row, and have the majority of the fruiting area in a shaded position. The light to the lower portion of the tree must penetrate from the interior or backside of the leader where the sucker production is heaviest and the fruit production and quality is poorest. The fruiting potential (volume of space filled with fruiting wood) of this orchard is also lower than it could be with a more upright leader. Keep the leaders as upright as possible by removing or benching down the outer limbs as appropriate and allow the light to penetrate from the

outside of the tree where the fruiting potential and fruit quality is highest. This is commonly referred to as a 'Steep Leader Tree'.

The first objective of your pruning should be to remove any laterals above the bottom lateral that has become one half to two thirds of the diameter of the leader, whether you are farming open center or central leader trees. A healthy tree with good vigor that is consistently pruned in this manner will quickly produce replacement limbs. Make all of the lateral removing or light penetration cuts on a leader or the whole tree first, beginning at the top of the tree, before doing any detail pruning.

The vertical distance between laterals will vary considerably from full size to dwarf trees, but has to be adequate to allow some full sun light to fall on the base of the next lateral down when the tree is in full leaf next July. This is 30% to 40% farther apart than you think it should be when you are pruning in January with no leaves on the tree.

If you did not take notice of fruit size and color on the inside of the tree at harvest this year, by all means do it next harvest. If there is a large difference in size and/or color, you need more light penetration into the tree.

The second most common error is to attempt to control the length of either a lateral or fruiting branch by making a cut in one year old wood, without taking into account the growth and fruiting habits of the tree. To properly detail the laterals, you must take into account the fruiting style of the tree.

On apples and pears the fruit is produced mostly on spurs. Remove the side branches from the laterals using the same size ratio as you would removing laterals from a leader, i.e., one half to two thirds of the diameter of the lateral. Remove spurs growing from the bottom and top 1/3 of the lateral and fruiting branch, the fruit will be either smaller than you want or scarred by limb rub. Stub old spur complexes back to one or two growing points to encourage new growth. Fruit size declines on spurs after they are 4 to 5 years old. (Count the fruiting scars, I've found spurs as old as 10 years on low vigor Bisbee, low vigor pears can be almost as bad.) Semi-spur and standard varieties have the same pattern, the difference is that the bourse shoot is 4 to 6 inches instead of 1/2 inch and that opens the structure up, allowing you spread your fruiting area farther away from the lateral, which means you should generally have less laterals in a Golden for example, than you would need in a Scarlet Spur. ***Do not stub or shorten one-year-old wood anywhere in the fruiting structure of the tree unless you want limb elongation.*** One-year-old wood is locally stimulated by pruning and will remain vegetative, producing one or more relatively vigorous shoots from the buds immediately behind the cut. To get maximum production, either leave the new wood in place for one year pruning it to a spur at the length you want it the next year, or remove it completely. Cutting a one-year-old shoot in half will only aggravate a branch length and shading problem.

On cherries, prunes, and plums the fruit is produced about equally on spurs and at the base of one-year-old wood of moderate vigor. Follow the same size rule as above for removing fruiting branches from the laterals. Remove all vertically growing shoots. Thin the remaining fruiting structure to allow equal light exposure, always removing the oldest wood possible. Pay special attention to the end of the lateral, especially on cherries. The tip wants to grow up and will very quickly become competitive with the leader. The end result is shading out of the interior and lower portions of the tree. Bench cut the ends of the laterals each year to an outward or side-growing shoot to prevent this. Do not stub or shorten one year old shoots (see the comments above for apples and pears).

On apricot the fruit is produced mostly on one-year-old shoots or one-year-old spurs. Apricots produce mostly spurs with some fruit on one-year-old wood, the spurs arising from two year old wood are the most productive with the best quality fruit. To maintain a constant cycle of producing wood, remove as much of the three year old wood each year as possible (it produced fruit on spurs last year). Leave a 1/4 to 1/2 inch stub for regeneration of replacement shoots. Remove the one-year-old growth from end of the two-year-old fruiting branch that will be kept for this year's production. Thin out the one year old growth arising from the lateral, keeping the medium diameter growth, shorten it by 30% to 50% to stiffen it and lower the cost of hand thinning, the outer one half of these shoots normally set heavily but produce smaller fruit. The one-year-old shoot will produce spurs on the lower portion for next year's production.

On peach and nectarine the fruit is produced on one-year-old shoots, most spurs do not survive to produce the second year. Remove from the laterals, the branches you picked fruit from last year, leave a 1/4 to 1/2 inch stub for shoot regeneration. Thin out the one-year-old shoots growing from the lateral, keeping the medium diameter shoots. The best quality fruit is normally produced along the mid section of an unpruned shoot, by shortening the shoot 25% to

40% you will keep the best quality production and reduce your thinning cost. If you cut the shoot too short (50% to 75%) you will reduce the production or will need to keep more shoots along the lateral to maintain production and may have difficulty producing enough good quality renewal shoots for the following year.

The third error I notice is stubbing the end of the lateral to a bud or shoot that is growing upward. In a very short time this results in a three or four year old 'tree' growing on the end of that lateral. This creates a severe shade problem for the interior of the tree, the weight leverage from the fruit on this very productive young 'tree', (it's fully exposed to the sunlight and grows very rapidly) brings the end of the lateral down so low that it is difficult to get a tractor through the orchard. Finally, with the lateral bowed down from the end each year, sucker growth will increase from the top of the lateral, increasing the shade problem. Don't let the problem get started in the first place. ***Always prune the end of the lateral to a side or down growing shoot.***