

GROWER FIELD GUIDE, June 2001

The subject of sprayer tank pH comes up frequently, especially when a material does not produce the results expected. Some materials require a relatively narrow range of pH, others can tolerate a broader range. The purpose of this discussion is not to determine what range an individual material should be adjusted to, but the potential for degrading the material by the sequence commonly used to fill sprayer tanks. Unless methods have changed since I actually drove a sprayer, as soon as the water was deep enough in the tank to circulate, the nutrients, insecticides and adjuvants begin to be added. When materials that can change the pH of the tank are added to a partially filled tank, their effect will be exaggerated until they are near the final dilution. If there is also an insecticide in the mix that happens to be sensitive to an extreme pH range, chemical damage could happen without you realizing the cause because by the time the tank is full and you might test the pH, it would be in the target range. The moral of the story is to adjust the pH to the appropriate range and add the sensitive materials last when the tank is nearly full.

What seems to be another misunderstanding is the relationship of half-life in the sprayer tank and effective residue on the tree. pH and the resulting hydrolysis occurs only in solution. The adjustment of the spray tank pH is to avoid rapid decomposition of material during the time you are spraying. Once the residue has dried on the tree, pH no longer exists, hydrolysis stops. I don't believe there is a practical difference in effective residue on the foliage between a material with a tank half-life of more than 24 hours and several days. While we don't have data on all of the materials we use, a general pH of 5.0 to 6.5 is recommended UNLESS the manufactures label states otherwise.

Usually by late June I'm beginning to have discussions with growers and other fieldmen about the inability to control cherry mildew, or Psylla, mealybug, etc. My first question will always be "How good is your coverage." When I ask this question I commonly get the answer that it's either 200 or 400 gallons per acre.

Gallonage per acre and coverage are not necessarily related. Coverage is more directly related to the ability of the fan on your sprayer to replace the air in tree canopy with air from your sprayer carrying the material into the tree. The smaller your fan or the lower your horsepower or the higher the wind speed, the slower you have to drive to get complete air replacement in the center of the tree canopy. Most insect and disease problems originate and spread from the center and upper portions of the tree where your spray coverage is the poorest. One spray cover that requires 50% more time to do right because you drove slower will be less costly than two sprays done as quickly as possible that don't control the problem.

If you really want to know if your coverage is as good as you think it is, add 50 lbs. of Surround to one tank of your next cover spray. That will tell real quickly what your coverage really is.

When is a pear not a pear?

When it's not Bartlett, Bosc or D'Anjou!

Last week I begin to hear of minor varieties, mostly used as pollinizers that are displaying sensitivity to Ecozin or Neemix and oil. This came as quite a surprise; Neemix and oil has been applied to pears for several years without incident.

Comice and most of its offspring such as Rymer Red and Cascade have been identified as sensitive. Conference however has not shown sensitivity. Easter and Flemish Beauty also are showing sensitivity. No strains of Bartlett, Bosc or D'Anjou have been reported as showing any sensitivity.

This program show some promise of being very cost effective. Psylla control with Ecozin or Neemix through the first generation is reported as equal or better than current conventional programs. We just need to sort through the details of cultivar sensitivity as we begin widespread use.

If you have treated other varieties and would like to help let either Tim Smith (664-5540) or myself (662-2141) know how they reacted so we can build a list of sensitive cultivars.

If you did not use Ecozin or Neemix for the first generation of Psylla but plan to for the second generation and have varieties other than those listed above, proceed with caution. Test spray a few trees and wait for at least a week to evaluate them.

Surfactants can be really confusing.

I get called frequently by growers and fieldmen asking if one surfactant (spreader/wetting agent, not to be confused with acidifying/buffering materials such as TECH SPRAY MG) can be substituted for another. The general answer is yes. Most surfactants recommended are non-ionic, 80% or more active ingredients. The manufacturer has to tell you this somewhere on the label, usually just below the brand name. I have not seen any performance difference in the orchard when I have substituted different brands of non-ionic materials of similar strength.

Why do we change brands? Price and availability. We buy only a few pallets at a time to keep our costs down. When we reorder, sometimes the old brand is not available immediately, or the price has changed. So we substitute another brand of equal quality. Sometimes our suppliers will offer a special price for reasons of their own. If it is attractive and we are satisfied with the quality of the product we will change brands to keep our prices down.

I know it's confusing for you, it's confusing for us too. But we do it to keep your costs down. Just remember, if it's non-ionic, 80% or better active, you can safely substitute for any uses described on the label. Use up your inventory first!

Some materials such as Retain, require a silicone based surfactant. The manufacturer will not warranty the performance if another class of surfactant is used. If a silicone surfactant has been recommended to you, don't substitute a non-ionic surfactant without talking to your fieldman.

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 shown per acre except those products where concentration of material is important.

All of the monitoring aids mentioned in this bulletin and research information on most of the insects and diseases mentioned are available through any Northwest Wholesale warehouse.

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I will email this to you the same day I take it to the printer, usually a week before you get it in the mail. All I need is your email address. You can read it with any program compatible with Microsoft Word.

Container Recycling

Your response to Northwest Wholesales' decision to be a collection point for empty plastic chemical containers has been impressive. Keep'em comin'. Properly rinsed of course! There is a poster on display with pictures and detailed instructions on cleaning containers at all participating locations.

If you're generating lots of empty jugs and need to store them briefly, here's an easy way to do it. After you've rinsed them, remove all of the excess labeling (plastic sleeve and booklets, etc;) labels glued to the jug are OK. Put them upside down in an old apple bin. They will drain clean and stay dry and clean even if you have to leave them in the orchard under the sprinklers for awhile. No second rinsing or draining needed with this method. Just load the bin and bring'em in.

Return Bloom

Post bloom thinning conditions were mixed again this year, the weather didn't always cooperate. Growers that were aggressive and didn't wait for that perfect day but applied petal fall sprays at petal fall even under marginal conditions generally have good results. I think we may be trying too hard to avoid marginal conditions this early in the season and frequently miss opportunities to reduce the crop load early.

If you were still trying to take off lots of fruit at 10 – 12 mm, return bloom could be questionable. You may be able to thin your fruit adequately well past the 10 to 15 mm size and still not have bloom for the following year. If less than half of the spurs bloomed this year, return bloom should not be a concern. Trees that had good bloom and thinned late i.e. larger than 10 mm size, return bloom can be increased with one or more applications of **Ethephon** (Ethrel) beginning 45 to 50 days after full bloom. Cell division is over by this time; fruit shape will not be affected. Don't apply Ethephon to a light blooming orchard, you will increase the risk of bi-annual bearing.

Wet the trees to an easy drip, 200 gallons per acre is probably adequate in most orchards, less volume may be used on smaller trees. Application under slow drying conditions will increase the absorption of the Ethephon. Use the lower rate of Ethephon if temperatures are expected to exceed 85° in the three days following application. Do not use on low vigor trees, small fruit and no growth will be the result. On very high vigor young trees you want to bring into bearing and varieties that are chronically bi-annual bearing, a second application should be made 10 to 15 days later.

Bitterpit

Frequency and duration of your calcium spray program is more important than the amount applied with any single spray. Start your calcium program early and include some calcium in every spray where it is compatible. If you plan on using summer oil applications this year, do not mix calcium chloride at more than 3 lbs. per 100 gallons of water to avoid potential injury.

MIRACALsp, a non-salt containing soluble formulation may be combined with a wide range of other materials at higher rates than Calcium Chloride. It will not increase sunburn in hot weather, as Calcium Chloride has been known to do.

Calcium Management

Calcium has been recognized for more than 50 years as an important element for reducing fruit disorders and improving fruit quality of apples and pears. To better understand calcium behavior the following points must be considered.

- Calcium soil reserves are usually adequate, but will not be readily available at low soil pH values (soil balance).
- Calcium moves into the tree passively with water movement only on new roots, directly behind the growing tip before the bark suberizes (active root growth needed).
- Calcium moves in the tree with water to the actively transpiring leaves and passes the less actively growing fruit (nutrient sink).
- Calcium concentration in the fruit drops as the fruit enlarges (dilution).
- Calcium may move out of the fruit to the growing tips under stress conditions (removal).
- Calcium can't compete with excess Potassium or Magnesium in the tree (antagonism).
- Calcium applied foliar will be absorbed into the fruit just below the peel, it will not move through to the other side of the fruit (coverage).
- Calcium applied foliar throughout the season has been proven more effective in reducing bitter pit and cork spot than either early or late season applications alone (frequency).
- Calcium Chloride moves through the apple cuticle faster than any other formulations of calcium that were lab tested in 1983 (efficiency). (*MIRACALsp @ 6.25 lbs./acre resulted in higher fruit calcium levels than 8 lbs./acre of Calcium Chloride in pear demonstration plots in 2000.*)

Considering the points of calcium behavior above, how do you manage your orchard for the best long-term benefits from calcium?

- Maintain a soil pH of 6 - 7.5, test your good soils about every three years, and test any soils under a corrective program every year.

- Promote early season root growth by letting your soil warm up as soon as possible in the spring. Do not irrigate until the shallow rooted cover crops are showing distress, then only irrigate long enough to rewet the soil profile, do not waterlog the root zone with long irrigation sets, especially on heavy soils.
- Don't promote vigorous shoot growth on bearing trees. Highly vegetative trees have an excessive number of growing points that will always win any competition with the fruit for calcium.
- Maintain adequate soil moisture during hot weather. Soft vegetative growth stressed by heat will draw moisture from wherever it can get it, including the fruit. Some calcium will go with the moisture, it won't come back.
- Do not apply Potassium or Magnesium fertilizers unless soil or tissue samples indicate a need. Both materials compete with calcium for a place at the dinner table and will always win the competition.
- Calibrate your sprayer to insure uniform coverage of the fruit throughout the tree. Removing vigorous growth from the center of the tree early to mid-summer will aid spray coverage for both calcium and pesticides. This also removes some of the demand for calcium by the growing points and helps improve the finish on red coloring varieties of fruit.
- Begin adding light to moderate amounts of calcium early and continue as close to harvest as possible.

IT HASN'T CHANGED — YET!

For most varieties what you get paid will depend mostly on the amount of color your fruit has.

For forty years I've listened as growers and industry organizations talked about apple color. Generally red color. And which strain was darker — or brighter — or more fully colored. And how poor the fruit flavor of the newest strain was compared to the parent variety. But that darker, brighter, redder strain was what most growers planned to plant — as soon as they could get the trees — because those apples were making the most money.

And nothing has changed. Two major criteria still determine what you will be paid — color and size. We could have a long discussion about what ought to be, but that wouldn't change anything, at least for this harvest. The most valuable Red Delicious will still be 90% or more red color and between 80 and 100 box size. The most valuable Gala and Fuji will also probably be the ones with the most color.

Is there anything you can do beyond good pruning, thinning, moderate nitrogen, etc that can promote color development?

I think there is. And I'm going to put some money where my mouth is. But first let me repeat a little history of some of the programs that have been used to enhance fruit color during the past 40 or more years.

First we tried ethrel.

The first material that I personally remember was Rotonate in the late '50s. This was manufactured from material removed from the carbon filters of our new fangled CA rooms. When it was applied about two weeks before harvest it did in fact increase color. Unfortunately the fruit colored because it was ripening and storage life was shortened. We now apply the same chemical (ethrel/ethephon) to accelerate sugar levels for early harvest.

Then we tried potassium.

In the mid '80s preharvest sprays of potassium were reputed to help in developing red color. My personal experience with this approach was inconsistency. Some years maybe yes, some years no.

To overcome this variability, growers have increased rates or made more applications. There is still a lot of variability from year to year. There have been instances of potassium treated fruit not holding well in storage because of accelerated ripening. It is also well established by researchers that an excess of potassium will suppress the trees ability to utilize calcium and magnesium, resulting in more fruit disorders such as bitterpit.

But not all potassiums are alike.

Most of the reports of fruit softening by the application of potassium sulfate have been anecdotal or from blocks treated without a check for comparison. Rick Wright suspects it may be the anion (the negatively charged element

combined with the potassium) that is contributing to the fruit softening. To get a direct comparison, in 1995 he arranged for a Yakima packinghouse to segregate fruit from a grower who was using both *Tech-spray Hi-K* and KTS.

KTS was applied to one part of the block, *Tech-spray Hi-K* to the other in equal quantities. There was a single application of 1 gallon per acre approximately 30 days prior to harvest. All other operations on the two blocks were identical. The fruit was placed in long term storage, packed in June of 1996.

Pressure recorded at packing averaged 13 lbs. for the KTS treated fruit, 15 lbs. for the *Tech-spray Hi-K* block. The KTS block graded 47.6% top grade WA EX, the Tech-spray treated block graded 51.9% WA EX. — 9% better color AND better condition!

The major difference in these two materials is the anion. One is sulfur, the other is phosphorus. We normally only talk about the cation (the positively charged element) but the plant has to deal with both elements in the compound and therefore may respond differently than we expect.

Now we believe copper plays a major role.

While developing foliar nutrients for the Leffingwell Company in the early '70s, Dr. McNall noticed that the application of copper influenced the development of color on a wide range of fruits and vegetables.

By the early '90s private consultants in the Yakima area were using foliar applications of soluble copper solutions for color development with measurable and consistent results. They have related to Rick Wright, the northwest representative for NUTRIENT TECHNOLOGIES since 1991, that color response was most consistent for them when leaf tissue levels of copper were 12 ppm or higher. At these levels of copper, additional potassium is not considered essential.

What are our normal copper levels?

CASCADE ANALYTICAL's area wide, long-term data base of tissue analysis shows the copper levels in the Columbia Basin and North Central Washington to be between 7 and 8 ppm. At least 4 ppm below the minimum considered necessary for consistent color development by the private consultants in Yakima who have been using this program for nearly 10 years.

Soluble copper is well known for its ability to mark fruit. One manufacturer of a foliar soluble copper recently removed the product from the market because of concerns it would be used for color enhancement and mark fruit. A second manufacturer changed his label to prohibit use after bloom for the same reason.

There is a safe and effective form of foliar nutrient copper.

In response to the demand for a safe foliar nutrition copper, Dr. McNall, owner and founder of NUTRIENT TECHNOLOGIES, formulated *Tech-Flo COPOCAL* and introduced it into the market in 1995. This wettable powder suspension is completely safe when applied at a neutral pH. Dr. McNall has included calcium and phosphate to make the copper safe for the fruit finish without reducing its efficiency.

Tissue analysis has shown that 1 gallon per acre of *Tech-Flo COPOCAL* will increase the copper levels by up to 4 ppm. Generally two or three applications of *Tech-Flo COPOCAL* are required to raise the copper high enough to get consistent response. The target level is 14 – 16 ppm. If copper levels are known to be extremely low more applications may be needed.

In 1994 and 1995 Rick Wright arranged large scale trials with packing houses in the Columbia Basin and in Pateros. Both trials had positive results, increasing the WA EX grade by 44% and 31% respectively as compared with an untreated check.

Combine TECH-FLO COPOCAL and TECH-SPRAY HI-K for maximum results.

Rick Wright has observed several trials on Red Delicious since then that have an average 34% increase in WA EX. Trials on varieties such as Gala, Braeburn, Jonagold and Pink Lady in Australia have also increased the packout of the top graded fruit, usually 15% to 20%.

Copper and potassium have both demonstrated an ability to increase red color development. Dr McNall combined these elements into one program in 1996 with *Tech-Flo COPOCAL* and *Tech-Spray Hi-K* to provide the most consistent results possible.

Adding calcium and phosphate helps prevent the fruit softening frequently associated with the pre harvest use of potassium for color development. In eight years of working with growers and packing warehouses using *Tech-Spray Hi-K* for color development, Rick Wright states that he has never seen a reduction in fruit quality in either pressure or physiological disorders such as bitterpit. In many cases the treated fruit was firmer than the untreated at harvest as well as when removed from storage.

Do you really need the potassium?

The experiences of the growers in Yakima indicate that you probably don't. Potassium is an abundant material the tree can easily extract from the soil. It also moves rapidly in the tree and is quickly available to all parts of the tree including the fruit. Unless you have a known potassium deficiency (below 1.4%) I suggest you focus on the copper and lower your cost per acre by \$40.

Here's the money I promised earlier!

Northwest Wholesale and Nutrient Technologies will pay for a leaf sample for the first 50 growers that will commit to treating a minimum of 10 acres with *Tech-Flo COPOCAL* to a target minimum copper tissue level of 14 ppm. We will take the sample about 50 days after full bloom (early to mid June) to determine your existing ppm of copper. Then you will know before you start how much copper and potassium you will need to make the program succeed. One quart of *Tech-Flo COPOCAL* per acre will raise the copper level 1-ppm. I expect most orchards will require 6 to 8 quarts (\$25 - \$ 39 total) per acre over two or three applications.

Call your fieldman now, I can only guarantee to provide leaf analysis for the first 50 growers that want to do this!

First Generation Codling Moth

As of May 18th, most areas were predicted to begin the first generation codling moth May 25 to the 1st of June. This is slightly earlier than last year. Monitor the temperatures in your area and use the model for proper timing for your location and expected pressure. Control of the first generation is important to avoid problems and higher costs later in the summer.

The second cover and third covers must take into account a higher possibility of needing control of aphid and possible leafroller (**see post bloom leafroller section**). Leafminer should be considered separately if possible (**see leafminer section**). Spider mite populations should be monitored, most orchards are well controlled by predatory mites, but surprises should be avoided whenever possible. (**see spider mites**)

Aphid control is **Provado** @ 3 - 5 oz. per acre with 2 - 4 oz. of **Silwet** per 100 gallons, the higher rate of Silwet normally lets you use the lower rate of Provado.

If you are not familiar with most of the predator insects in your orchard, **PNW 343, Beneficial Organisms Associated with Northwest Crops** has good color pictures of some the critters you need to know. It's available at cost at your NWW warehouse.

Post bloom Leafroller

Now (early June) is a very good time to assess how good your early season controls were and how much control you may need during the rest of the year. Remember the female Leafroller does not fly very far from where she emerges so low pressure populations are usually very spotty, you must look at several locations in the orchard to determine what surviving populations you have.

If you had damage last year at harvest, that is the place to look first! Less than the best control of the overwintering generation (you could still find an occasional larva or pupa) means that you will probably need to start monitoring the first summer generation about the time of your second cover codling moth spray sometime in late June. If you achieved very good control (you can see where they were but can't find any live ones) your timing for potential damage will be later and is probably closer to the second generation of codling moth in July.

Unfortunately there is no reliable method of trapping to monitor for either population levels or emergence timing for small (20 - 30 acre) locations. Unlike the female Leafroller the male will move long distances in response to a pheromone lure, the catch in your trap could be from any one of your neighbors. Keep looking for the first larva to begin showing up on the back of terminal leaves in the upper center of the trees.

It is very time consuming to search for newly hatched Leafroller larva in the center of the tree. My method is to walk slowly along the row looking at the upper terminals against a bright sky. Any thin spot in the leaf caused by the feeding of the young larva will be very easy to see, down to match head size. You need to carry a pole pruner or some other means of getting some of the terminals down where you can examine them, there are other conditions and insects that will tatter or make holes in the terminal leaves. A Leafroller larva will have a shelter of webbing built against one of the major veins of the leaf before it is large enough to roll the leaf. When you find these it is time to begin your control program.

Summer generation control materials include **Intrepid 2F** @ 16 oz./acre, **Success** @ 6 – 8 oz./acre, and **Bt** formulations @ 1 – 2 lbs./acre. If you used Success at petal fall I recommend you use something different for the summer generation.

San Jose Scale

This pest is usually first noticed at harvest in isolated locations by the red spotting on the fruit or at pruning when the overwintering scales are noticed on the bark of the tree. On cherries the dried leaves will stay on the tree all winter. The crawler stage may be spread to other trees by the wind, being carried on the feet of birds, on orchard equipment or even on the clothing of workers.

The best approach to orchard protection is to prevent scales from becoming established. Spray the orchard every year before bloom (delayed dormant oil & Lorsban) when buds are beginning to open and good spray coverage is easy. Summer sprays directed at the crawler stage help protect the fruit but usually do not control infestations. For this reason they are a supplement to the early season sprays, not a substitute.

It is difficult to sample for population density or potential for fruit infestation. If damage was noticed the previous harvest or reported on the cull analysis from the warehouse you should consider summer control until damage is no longer found. The crawlers of the first generation time closely with the second codling moth cover in mid to late June. Without a long residual material such as PennCap, application timing is important. If you have an uncontrolled site (riverbank willows etc,) that you can relate to your orchard, monitor that site on a regular basis. Double sided tape wrapped around a few branches will capture the first crawlers and let you time your orchard protection.

Tim Smith doesn't have a biofix and can't build a model this year. In Okanogan County, Dan McCarthy will be monitoring for second generation crawler timing and will inform our fieldmen as soon as he finds it in his location. They will use that information to time your protection if you need it.

Esteem has performed well for San Jose Scale control in California and test plots in Washington. Apply **Esteem** at 13 to 16 oz. per acre when the crawlers first emerge. Use oil up to 1% to improve control. (Not on cherries! Check with your fieldman if you had summer scale on cherries last year.)

Spider Mites

Only a minority of the apple orchards in North Central Washington have to control for spider mites in any given year, sometimes we forget to watch for the critters until the damage begins to show in July and early August.

By June you should be able to find some European red mite scattered throughout the tree. Look on the older leaves. If you easily find leaves with several adults, many eggs and very few or no predators, monitor on a weekly basis until you decide who is going to win, the good guys or the bad guys.

The twospotted mite and the McDaniel mite populations will start in the center of the tree as they move up from the orchard floor and then out onto the branches as the population develops. Just a few predators will control a relatively large population of these mites, but if you find more than just a few adult mites per leaf you should also monitor them on a weekly basis.

There are two major predators of spider mites in the orchard, the most common is the **Western predatory mite** (*Typhlodromus occidentalis*). It feeds on spider mites and rust mites. The egg is oval, transparent when laid turning

translucent white after a couple of days. When populations are low early in the season most eggs are laid singly on the back of the leaf along the mid vein. The oval eggs are easy to distinguish from the eggs of the McDaniel or twospotted mites, which are round, smaller and laid randomly on the exposed areas of the leaf. When twospotted or McDaniel populations are high, predator eggs will be laid among the mite eggs and in the webbing. The body of the mature predator mite is broad at the rear and tapers toward the head. They are opaque white unless they have fed recently then they take on the color of whatever they are eating. They avoid direct sunlight and will be found on the back of the leaves, usually sheltered against the mid rib of the leaf.

The other major predator of mites is *Zetzellia mali*. It feeds mostly on rust mite and European red mite. It may not be able to control high populations of mites but will maintain control of low populations if not disturbed by toxic pesticides. The eggs are round, lemon yellow and smaller than spider mite eggs. The adult is lemon yellow to reddish and slow moving. It is almost oval but more pointed at the rear and slightly smaller than a spider mite.

There are no absolute numbers for deciding at what levels to spray for mite control, experience is the best guide. Weather, time of year, tree vigor etc., are all factors to consider. If you can see that the predator mite population is building, enduring a slight bronzing of the foliage should not affect the crop, especially a light crop, and should result in establishing or reestablishing fully integrated mite control.

Leafminer

(a reminder from May)

This is a mostly cosmetic, sometimes pest. This year you have it, next year you don't. The first generation is usually unnoticed unless populations are very high. Most of the eggs are laid on the primary leaves, the rapid expansion of the foliage covers these before the mines become visible from the top of the leaf. The second generation will be more visible as the female prefers to lay eggs on the young expanding leaves of the growing shoots. By the time this generation has reached the late tissue feeding stage (the mines are tenting up), parasitism should be fairly easy to find. You can tolerate 4 - 6 mines per affected leaf at this stage if you can find either parasite larva or pupa or dead leafminer pupa in 25% or more of the mines and will not be using a material that will destroy the parasite population. Full control with a single spray is difficult after the second generation because of the overlapping of generations and the resulting mix of all development stages later in the season. If you have some predators available and target your sprays to preserve them you won't need full direct control.

To preserve the most predators, time the spray when a majority of the adult leafminers have emerged (60% or more) and egg laying is beginning. The parasitic *Pnigalio* wasp will be just beginning to emerge and most of them will survive to attack the next generation. There are several materials that may be used to control adults. **Vydate L** at 1 pint per acre, **Malathion Methoxychlor** @ 2 qts. per acre or **Omni, Stylet or Volck Clear oil** at 1%, wetting the trees thoroughly. The oil damages the wings and renders the adult flightless, plus it will suppress any mite or leafhoppers present.

If you need to control mines in the sap feeding stage, use **Success** at 6 oz. per acre with ¼% oil, or **Agrimek** @ 10 oz. per acre with 1 gal. of oil per acre, or **Vydate L** at 1 qt. per acre. None of these materials will provide good control of the tissue feeding stage, apply them as early in the egg hatch as possible.

Monitor the leafminer from the back of the leaf. The eggs are very small, nearly transparent and lime green. As they hatch the larva will begin to tunnel in the leaf making a thin white line beginning at the edge of the egg and rapidly expanding into an easily visible white spot. The mine will not be visible from the top of the leaf until the tissue feeding stage and the leaf begins to pucker up. To search for the *Pnigalio* larva you must open the mine. A pair of tweezers works well for this. Just pinch the edge of the mine and peel the loose cover off. The *Pnigalio* larva is white to cream colored and spindle shaped. It feeds on the exterior of the leafminer larva and is easy to see with a hand lens. The pupa begins very light gray and darkens to a shiny black, it is ½ to 2/3 of the size of the leafminer larva. If you open flat mines and find discolored or very lethargic leafminer larva, that is a pretty good indication that the *Pnigalio* wasp is active in the orchard.

If you need aphid control at second cover time and would like to increase the chances of predator control of a light to moderate leafminer population, use **Provado** at 2 ounces per 100 gallons with **Silwet** (a silicone surfactant) at 1 ounce per 100 gallons in enough volume to wet the tree to an easy drip. This will suppress a leafminer population by killing most of the sap feeding stages and allowing a high number of the *Pnigalio* wasp to survive.

Grape Mealybug in Apples

Very little research has been done on the second generation of mealybug in apples, I could not find any published articles in my files. The insect biology supplement to the 1992 WSU Spray Guide noted that there may be a complete second generation on apples beginning in early to mid July.

If you have a population in your orchard you probably know about it from previous fruit damage or the presence of the cottony overwintering egg masses. Begin to monitor the suckers originating from spray sheltered areas of the tree in late June and early July to time the emergence of the crawlers and direct the sprays against this stage. It seems that you can only kill what the spray contacts, you will probably need two applications 10 - 14 days apart to control this second generation. The larger, wax covered stages are not controllable.

Sevin, Guthion, Imidan, Diazinon, and Provado plus oil all seem to give adequate control if the material contacts the insect. Rotate materials to delay insect resistance.

APRICOT

Peach Twig Borer (PTB)

As of May 22nd Tim Smith did not have any reports of PTB catches, he doesn't know of anyone with traps in place. Last year the first PTB catch in the Wenatchee area occurred the weekend of May 14th at Baker Flat so I suspect we are too late to set biofix this year for the early districts. If you have monitored for PTB in another area and have a catch date, please call myself or Tim Smith at Cooperative Extension so timing models can be run for your area. We will update you weekly on the progress of the current generation. Check with the counter at your nearest warehouse to see what areas have models being developed, current models are faxed out each Monday afternoon or Tuesday morning. The alternative is to apply Imidan 70WSB or Success 14 days before you expect to pick the fruit. If you plan to use a different material you must watch the preharvest interval.

NOTE: Azinphos Methyl (Guthion) is no longer legal to use on Apricots.

Lecanium Scale

I've had several calls about Lecanium scale this spring as the feeding nymphs begin dripping honeydew down through the tree. By now they have matured and the female scale are very conspicuous bumps on the smooth bark of the younger limbs. Remove some of these and look to see if there are still eggs present. Soon after egg hatch the young nymph will move to the underside of the leaves to feed. Apply Diazinon to the crawlers for control, preferably dilute. Be sure to allow for a 21-day preharvest interval.

Plan on applying oil prebloom next spring to prevent a repeat problem next year.

Perfection Spot

Perfection Spot is aggravated by rain, your past history has a strong bearing on how much protection you may need. **Rally 40WP @ 5 ounces per acre**, or **Orbit @ 4 ounces per acre** both work well on Perfection Spot. Combine either one with **Captan 50WP @ 5 lbs. per acre** for Coryneum Blight or Alternaria.

Weather conditions that favor either apple scab or cherry mildew also are conducive to the development of Perfection Spot, Alternaria (Apricot Freckle) and Coryneum Blight.

CHERRY

Cherry Viruses

It is rare not to find a few trees in a block of cherries that are not doing well. Especially if the trees are more than 20 years old. In most instances these trees are infected with one or more viruses. There are several cherry viruses, some quite dangerous to the future production of the block. Cherry Mottle leaf, Cherry Rasp leaf and Cherry Twisted leaf are the viruses that I see most. The best time to patrol your orchard for virus symptoms is between shuck fall and your GA application before mildew becomes visible on the leaves to confuse the identification of a virus. Look at all sides of the tree, frequently virus symptoms begin in a single branch. It becomes very difficult to identify viruses after harvest except for extreme symptoms.

There are two genetic disorders, Crinkle leaf and Deep Suture, that can be found by noticing abnormally shaped leaves and fruit. These disorders may be pruned out if they don't affect large portions of the tree. In young blocks you might want to top work these trees.

Extension Bulletin 1323, **Field Guide to Sweet Cherry Diseases of Washington** is a good reference to help you identify these disorders plus some others that I haven't mentioned. It may be seen at any Northwest Wholesale warehouse. Copies are available at NWW and Cooperative Extension.

Mildew

Stylect and Omni oil are very effective as early season mildew eradicator/protectants. We recommend that you do not apply oil much past pit hardening to avoid possible fruit damage. If the trees clean are kept free of mildew prior to GA time there should be less need to use other chemicals during the ripening and harvest periods.

If the temperature is below 90° and is expected to remain for the following 5 to 7 days, you may tank mix any of the Sterol Inhibitor materials with Kumulus Sulfur or Sulforix. Keep oil and Sulfur or Sulforix 10 to 14 days apart. None of the materials currently being used are systemic. If the foliage has not been directly sprayed it is open season for any new mildew spores that lands on it, thorough coverage is essential for mildew control!

Continue to protect yourself at infection periods. Once mildew is established on the foliage and fairly easy to find it will spread rapidly with warm weather. 10 to 14 day intervals must be maintained into harvest, especially on the Rainier variety.

Abound is a relatively new compound for cherry mildew, but extremely phytotoxic to some varieties of apples. This has resulted in the label for the material requiring a separate sprayer for stone fruit use only. Avoid any drift onto apples. A sprayer used for applying **Abound** must be thoroughly clean prior to selling. Thorough cleaning is a 24 to 48 hour procedure. The complete caution and cleaning statement is available at any Northwest Wholesale warehouse, please read it before you decide to use the material.

Cherry Fruit Fly

Emergence of the first fly typically happens about the same time as GA is applied, when the fruit becomes light green to straw colored. The potential number of Cherry Fruit Fly increases as the fruit ripens, peaking during or shortly after Bing harvest. Most markets have a zero tolerance for fruit fly infested fruit so a rigorous prevention program is required. The list of acceptable materials is short.

Diazinon AG500 or **Diazinon 50 WP** is not accepted in most export markets, most warehouses request that you do not use it. For local marketing or home use Diazinon is acceptable and works well. Rainier or other light skinned cherries may be marked by the liquid (AG500) formulation. The preharvest interval (PHI) is 21 days.

Guthion 50WP, Guthion 3F, or Azinphos Methyl must have a 14-day interval between sprays. Guthion 3F has a 7-day PHI, all other forms of azinphos methyl have a 15 day PHI. Guthion 3F is no longer available. Existing supplies should be used up as soon as possible, the shelf life is more limited than wettable powders. Guthion following oil for mildew at pit hardening may cause some leaf drop if the weather has been cool. To avoid possible problems, I recommend you avoid the use of Guthion for Cherry Fruit Fly if you have used oil on the foliage post bloom.

Success was registered for cherries last year. Use it @ 2 oz. per 100 gallons with complete coverage. It is compatible with any of the commonly used fungicides and GA. Four ounces per acre (200 GPA) will control Cherry Fruit Fly but will only suppress leafroller if they are present in the larval stage. Two Success applications at 7 day intervals should do a reasonable job of eradicating leaf roller along with Cherry Fruit Fly. The PHI is 7 days.

Sevin in all forms has a 3-day PHI, some older carbaryl labels have a 1 day PHI. Next season they will all be 3 day PHI. Using this material multiple times may increase your risk of post harvest mite infestation. However control of Cherry Fruit Fly is essential to protect the value of the crop, mite problems if they develop can be solved after harvest.

Pyrenone (Pyrethrin + PBO) is a good fly killer but it does not have any residual control. Initial coverage must be complete. The application rate must be reduced to 80 to 100 gallons per acre to keep the cost reasonable. Harvest may continue without interruption. Consider this material to be the equivalent of an aerial ULV Malathion.

Pyganic (Pyrethrin) is an organic fly control material. This material will also perform better if sprayed at 100 gallons per acre with very good coverage and calibration. Harvest may continue without interruption. Consider this material to be the equivalent of an aerial ULV Malathion.

The **Micro Flo Dimethoate 4E** label allows for use both before and after harvest. The PHI is 21 days. Not all countries have a residual tolerance, check with your warehouse before you use it. Sensitive varieties such as Lapins may experience some leaf drop.

Control of Cherry Fruit Fly is based on the life cycle. It requires approximately 7 days to emerge, mature and begin to lay eggs. The ideal control schedule is to apply a material every seven days after the first fly emerges. You don't want to allow any of the flies enough time to mature and begin laying eggs. When infected fruit has been discovered at the packing house it is also usually discovered that the coverage interval has been extended to 10 to 12 days because of poor weather or harvest work. Keep your coverage on time and complete until all of the fruit is harvested, then apply a clean up spray to insure that you start off the next year clean again.

The sequence I am recommending this year begins with the GA spray and Sevin (carbaryl), 7 days later a Success, 7 days later another Success, 7 days later another Sevin (carbaryl) if you are still spraying from the ground. This program will provide excellent Cherry Fruit Fly control unless the interval is stretched out. It should also control a leafroller population. None of these materials will leave a residue that would prevent using a Vapor Gard program.

Clean up spray

To reduce the overwintering population of Cherry Fruit Fly apply $\frac{1}{2}$ pint of **Dimethoate 4E** per 100 gallons of water in a dilute spray (trees fully wet and dripping easily) 7 days after final harvest. Combine with 1% oil, (you may use dormant oil post harvest if you have some left over) to prevent mildew from forming overwintering spores. The oil will also suppress spider mites and kill most of the adult leafminers that are in the orchard. Use a minimum of 200 gallons per acre. Concentrate applications will increase the risk of leaf drop. For best results the application must be made before the fruit dehydrates or drops, do it as soon after harvest as possible.

I know that there is some concern about leaf drop from Dimethoate. I have never seen enough leaf drop from this concentration to have an affect on next year's crop. I take the position that the risk of crop reduction is less than the troubles you'll have if the next year's crop is infested with Cherry Fruit Fly!

Vapor Gard

(in case you have forgotten since May)

I have worked with Vapor Gard on cherries for the past several years and personally would not grow a cherry crop without using it. The benefits that I have seen are as follows; increased fruit size (5% to 7%), rain is blown out of the trees easier than untreated trees, rain cracking is reduced under slight to moderate conditions. When rain cracking is severe there is no material difference between treated and untreated. The fruit finish remains bright after application and does not dull in storage. Shelf life of the fruit is increased. I have had one grower tell me that he has less wind marking on his Rainier cherries when he used Vapor Gard in multiple applications. Subjective, but possible.

Vapor Gard may be combined with your GA spray this year to save you a trip through the orchard. I also believe the GA is enhanced by the slower drying time when Vapor Gard is included.

There are some serious cautions that must be considered to use Vapor Gard successfully. The fruit must be clean when the material is applied. Mildew must be well controlled and the use of heavy residue sprays such as Kumulus Sulfur stopped at least 14 days before any Vapor Gard application. A dirty cherry treated with Vapor Gard can **NOT** be cleaned up at the warehouse. Orbit, Elite, Rubigan, Rally, Guthion 3F, Benlate and Sevin 4F have not caused residue problems in orchards using multiple Vapor Gard applications in the month prior to harvest. Mildew and Cherry Fruit Fly control has not been hampered by the use of Vapor Gard. No detrimental effect on the trees has been observed. No difference in fruit sugar has been measured when controlled experiments were performed.

A single application of 1 gallon per acre shortly after the GA application normally results in about a 5% size and tonnage increase.

The most consistently beneficial program I have observed is one gallon per acre applied at the same timing as the GA treatment, followed by another 1/2 gallon either just before or just after each of the ground applied Cherry Fruit Fly sprays. There is no preharvest interval required. Complete and uniform coverage of the fruit and foliage is needed, don't use less than 200 gallons per acre.

If you aren't using a Vapor Gard program but want some rain protection during harvest, apply one gallon 7 to 10 prior to harvest or just before anticipated rain @ 200 gallons per acre. The material cures with about 1 hour of bright daylight and is completely rainfast after that. Vapor Gard will not set up anywhere inside the sprayer that is not exposed to bright daylight but the outside of the machine will be very difficult to clean.

Fruit pitting has become a major concern with the Lapins variety over the past two seasons. Research work done in Canada in 1979 & 1980 with Van cherries shows a reduction of pitting (65 to 84%) using Vapor Gard immediately before harvest. More work should be done locally using multiple and single applications to determine if Lapins will react the same.

Birds

Bird Shield and ReJeX-iT are similar materials in that both employ the odor and taste of concord grapes to repel feeding. They are applied at different rates, so read the label for the material you plan to use.

Both materials must be applied at the first evidence of bird feeding. It is much easier to keep birds out of the orchard than to drive them out after their feeding habits are established. Resident (nesting) birds do not normally leave the orchard. Do not over apply. Young orchards that are very open, the adjacent rows that are being resprayed could suffer some leaf burn. Consider alternate row application under this situation. Wet the portion of the tree that you are targeting well, but do not over spray. (Saves money, too.)

The material smells and tastes like concord grapes. Birds don't like it. The flavor breaks down in bright light and must be completely undetectable before you harvest the fruit. Normally 7 to 10 sunny days are needed for this to happen. I believe you should apply it similar to a thinning spray on apples. Close off the bottom nozzles and put the majority of the material in the top and outside of the tree. That is where the initial bird feeding will begin and the high light levels there will breakdown the grape flavor quicker.

If you have nesting or roosting trees adjacent to your cherry orchard that birds are using for a staging area, spray those trees also. Use a handgun if you can to get the material as high in those trees as possible.

PEACH/NECTARINE

Green Peach Aphid

If you have a population of Green Peach Aphid post bloom, it is my opinion that you either sprayed too late, (past bud stage 3) or had incomplete coverage. Unlike apples, adult aphids do not migrate onto peaches in the spring or early summer. The population you see now has developed from eggs laid on the tree last fall. As the colonies mature they will leave the trees for alternate hosts. If you have applied a post bloom Asana for control of Green Peach Aphid, be very alert for mite population increases during June and July.

Peach Leaf Curl

Your fall copper applications combined with a dry spring must have done the job. No calls this Spring. Don't forget to do the same again this Fall.

Mildew/Coryneum Blight

The first visible indications of a **Coryneum Blight** infection on the fruit will be a watery looking spot, some with a tendril of ooze curling out of it as the disease progresses. This usually doesn't happen without a few days of wet weather. **Ziram** or **Thiram** are a good protectants, use 5 lbs. per acre applied before the disease is established. Use two **Captan 50WP** applications @ 5 lbs. per acre 10 - 14 days apart if you can see the disease developing on the fruit.

Peach Twig Borer (PTB)

See the Apricot article for information on monitoring Peach Twig Borer. The control timing if you don't use the model on Peach or Nectarine is 7 to 10 days later than on Apricots because there is no need for a pre harvest interval at this time of the year. Success is labeled for Peach Twig Borer. We don't have any local experience but the material is performing well in California.

PEARS

Depending on temperatures the first generation of Codling moth usually lasts for 6 - 8 weeks. A second cover will be needed 18 - 21 days after first cover, sooner if a good rain fell shortly after application. Second cover is the time to be concerned about the summer generation of Mealybug also. **Use Azinphos Methyl /Guthion 50WP or Imidan 70WSP** at maximum rates. Azinphos/Guthion is the stronger Codling Moth material, but it now has a 14-day PHI. Add a calcium material.

There are too many variations of Psylla and Spider Mite control programs to address specifically in this letter. As of now I have not heard of any control failures regardless of the program used, but it is still early in the season.

Almost universally the growers that applied Surround multiple times pre bloom had less Psylla pressure at bloom than growers that did not use Surround. Applying more than 50 lbs./acre per application did not increase control. By two to three weeks after bloom some Psylla could be found in nearly any pear orchard. The oil/Ecozin or Neemix applications do not seem to be materially different at this stage than the conventional programs.

What do you do now? This will depend on the Psylla or Mealybug pressure in your orchard and whether you are comfortable with a softer program or not. Last summer several blocks successfully controlled Psylla and Spider Mites with nothing more than a program of summer oil at approximately two-week intervals after the petal fall Agrimek.

If you prefer the conventional programs, Pyramite, Provado, Agrimek, Mitac, perhaps Actara should be applied as first and second instar nymphs are found. The addition of summer oil up to 1 1/2% increases control.

For additional Spider Mite control, Savey or Apollo (ovicides) may be combined with adulticides such as Pyramite, Agrimek or Vendex to delay or prevent a rebuilding of the mite population. Acramite may become available later this year (we are waiting for a label).

Fire Blight

Secondary bloom on Bartlett begins 2 - 3 weeks after petal fall and continues for up to a month. It will be worth your while to physically remove any open bloom within two to three days after an infection period. As Tim Smith says, that control method is 100 percent effective if done carefully. If you choose to apply Mycoshield, monitor the daily temperatures and compute your risk by using the **CougarBlight** model. Managing your risk in this manner will save you time and money versus 'just in case' spraying. It will also preserve the use of the only currently effective material by slowing resistance development. Copies of the CougarBlight 2000F are available at any NWW warehouse or on the internet @ <http://www.ncw.wsu.edu/FB2000f.htm>