

## GROWER FIELD GUIDE, March 1999

Ready or not, the 1999 growing season has begun. We all know this will be another very challenging year with the probability of adverse weather, uncooperative insects and the possibility of another saturated market for the crop. With this scenario in mind, we at Northwest Wholesale pledge to do our utmost to assist you in bringing a quality crop to the market at the lowest possible final cost.

We have added additional equipment to enhance our ability to make product deliveries from the Wenatchee warehouse to growers from Rock Island to Orondo on the east side and from Entiat to Clockum creek on the west side. The delivery truck will follow a daily schedule, call Mark Hartman at 662-3563 to find out what day of the week we will be in your area.

Ag Supply in East Wenatchee will be stocking seasonal chemicals for Northwest Wholesale again this year for low volume pick up to save growers on that side of the river a trip into Wenatchee.

This year's FIELD GUIDE will be very similar to last year's, updated for material changes and with some increased emphasis on mating disruption and other softer controls as more of our older materials are removed from the market place. We have also developed an Organic program that each of the fieldmen will have. I don't have space to cover that those programs in this FIELD GUIDE in detail, if you want a copy of the complete programs as it is currently written I will furnish you with one. There are many material listing changes in the Organic Materials list this year, do not rely on the 1998 copy!

Your input regarding the problems you are experiencing and the value of this newsletter to you are invited.

### Information Sources

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 bulletin. Any errors in presenting that information to you are entirely mine, I would appreciate being notified of any errors so that they will not be perpetuated.

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

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### How will you look at cost?

Cost control seems to mean different things to different people. Effective cost control in fruit growing is obtaining the best available combination of product and results. Applying a product either too early or too late in an insect or plant growth stage is costly. Applying a less expensive but less effective product that either requires additional applications or results in increased damage to the quality of the crop is costly. Not applying a product that will increase the quality value of the crop beyond the cost of the application is costly. Ineffective products and practices don't save money, they cost money. The surviving grower will be using effective products and practices with the direct price of either being less important than the final realized cost per packed box of Washington Extra Fancy fruit.

The necessity of producing high quality, high value fruit can hardly be overemphasized, especially when it is likely that the consumer will have a surplus of fruit to choose from. While the particulars may vary for each fruit the following are universal. The fruit must first of all be attractive, i.e.; well-shaped, good sized and colored appropriately for the variety. It then must have the internal strength to survive picking, packing, shipping, merchandizing and the kitchen counter with minimal damage and deterioration and then ultimately to taste good when eaten. Every grower must recognize that the average consumer does not know or care in the least what cost and effort is put into growing a quality piece of fruit. He or she only buy and eat what looks and tastes good.

To be cost effective, a grower must understand the specific problem at hand. I know that sounds simple, but I have had the experience of a grower calling me to his orchard to investigate a codling moth problem that he had not been able to control with multiple sprays only to find that he was misidentifying stinkbug damage for codling moth stings. This may be rather unusual, but it demonstrates that a problem has to be correctly identified to be treated in a cost-effective manner.

Timing of control can impact cost. Insect and disease pests that may directly affect the fruit (codling moth, leaf roller, Lacanobia, thrip, Lygus, Psylla, scab, mildew, etc.) are more effectively treated as early in the pest or disease cycle as possible. This greatly reduces and occasionally eliminates the need for additional controls later in the growing season. Skimping on early season control of this category of pest is rarely cost effective!

Insects that primarily affect the tree and only indirectly the fruit (aphid, leafminer, leaf hopper, mites, etc.) should only be treated on an as needed basis, some years weather conditions or predators provide adequate control with little or no affect on the crop. Time spent in the orchard either by you or an experienced fieldman locating and identifying what and how much is there is the only way I know to minimize pest control costs.

Fruit thinning is absolutely necessary for quality fruit, the least expensive thinning you can do is aggressive chemical thinning. Begin at bloom and use every opportunity during the post bloom period to remove some more fruit. The most expensive thinning costs I have seen were when I or the grower thought enough apples had been removed and did not put on the next thinning application resulting in a high labor bill to hand thin later. If your trees bloom relatively light this spring you will have to be more aggressive than usual with post bloom thinning, lightly set trees typically do not thin as easily as heavily set trees. If you're not nearly sick with worry over removing too much fruit, you haven't done enough yet!!

Size, shape and color enhancing materials (promalin, cytokin, and foliar nutrients) that have the ability to put more of the fruit in the top grade are cost effective. None of these materials will make up for poor cultural practices or poor varieties but will help the best orchards to produce more top grade fruit

The most cost effective program will be good products combined with the knowledge to use them correctly to control or prevent quality degrading factors as early in the season as possible. Lowest price does not always equal lowest cost.

## **Benefit or unnecessary cost?**

All good things must come to an end, so the saying goes. What prompts the immediate observation of this phenomenon is the announcement that Wilbur Ellis Company will be administering the conversion of the Howard Flat CAMP project to private funding. To assess the chances that this will succeed we must look at what information was gained by the project, how can an individual grower use it and what is the economic benefit to the grower.

The Howard Flat CAMP project and others like it around the state have proven beyond doubt that control of Codling moth by mating disruption is effective, with dramatic population reduction in orchards under high pressure. Larger areas are obviously more effective because the border effect becomes smaller and smaller as the treated acreage becomes larger. It has also demonstrated the need for intensive orchard monitoring as the pest complex in the orchard changed, bringing some minor pests into the spotlight as primary concerns.

Northwest Wholesale has also been concerned about how or if the practice of mating disruption would continue when the "free" money ran out. For the past two years our fieldmen have been asking growers both within and outside of mating disruption projects if they would continue or join in a cooperative effort similar to the CAMP projects if the cost of the effort was to be funded by an acreage fee.

Using information gathered from various CAMP project plus the experience of our own fieldstaff in monitoring codling moth traps, we determined that support for an individual with an entry level wage, transportation to and within the orchards for weekly monitoring of traps at a density of 1 trap per 2.5 acres would cost \$30.+ per trap per year. Trapping at a lower density would cost slightly more per trap but would lower the per acre cost.

When growers were made aware of this cost, enough of them answered in the negative to discourage Northwest Wholesale from pursuing the idea of organizing large area trapping projects. We will instead approach mating disruption and trap monitoring on a grower by grower basis as the economic return to the individual grower warrants adoption of the practice.

CAMP projects had to have intensive trapping and monitoring because hard data had to be generated to determine the success or failure of mating disruption as a practice. Codling moth behavior and survival information was very important to the scientists committed to making the projects succeed. As the science of the project terminates and the economic return to the grower becomes paramount, the need for investigative data disappears, replaced by the need for operational data, i.e. only what the grower needs to protect his crop from economic damage.

Under this criteria data from a wide area will have little or no bearing on the operational decisions of a grower, he must respond to what is actually in his orchard, with the monitoring effort directed to the locations most likely to be affected or infested first.

The idea of area wide intensive moth trapping is not unlike the mite counting services that were common in the late 1960's as many orchards converted to integrated control of mites. After one or two seasons of formal counting and reporting growers and fieldmen became comfortable with what they were seeing directly in the orchards and the need for paying someone else to brush mites off of leaves and count them through a microscope disappeared. As growers and fieldmen have become more comfortable with codling moth mating disruption, the intensity of the trapping has successfully been lowered from one trap for each 2.5 acre to as low as one trap in 10 acres, some instances even lower than this.

Trapping is only a part of monitoring for insects, searching the tree for signs of population increase or feeding damage and understanding what the information gained means in economic terms is the larger part. No individual or company can provide that service without getting paid for it, either directly on a fee for service basis or indirectly in the cost of the products used to protect and enhance the crop. A fee of less than \$30 per season per trap is probably an indication that some of the cost will be recovered by the service provider by increased price or product usage.

Before a grower pays a direct fee for trapping, he should look at all of the alternatives.

Do I need the service?

Is my current labor force able to do it for less cost?

Could one or more individuals in my labor force be trained easily?

Should I do it myself?

Please feel free to contact any Northwest Wholesale fieldman for additional information on this or any other matter dealing with the economic production of high quality tree fruit.

## **Mating disruption for Codling Moth**

### **Rational**

The majority of the chemicals commonly used for control of insect pests in apple and pear orchards are being reviewed under the provisions of the Food Quality Control Act. Many if not most of them will be lost to agricultural use over the next 2 to 3 years. Fruit growers must learn new pest control techniques within this 2 to 3 year window while 'rescue' materials are still available in the event of a management failure. The immediate economic considerations to the individual grower are being overruled by the political needs of the consuming public concerned about the safety of the food supply and their overall exposure to chemicals in the environment that they consider being 'high risk'.

### **Elements necessary for success**

Pheromone dispensers must be placed in the orchard prior to king bloom opening.

Monitoring traps (10x lures) must be in place by full bloom.

Lures in the traps must be changed at the proper intervals throughout the season.

The trap must be serviced and maintained adequately to insure moth catch.

Biofix, using standard (1x) lures, must be determined at a point outside the treated orchard to accurately time chemical control of the first generation if it is required.

Absolute chemical control of the first generation of codling moth is required in the initial year. Chemical control of the second generation may be needed if trap catch persists. The need for supplemental chemical control in subsequent years is determined by the remaining population or outside pressure.

## Techniques

Pheromone dispensers must be placed high in the tree, within the top two feet if possible. It must be securely attached to a portion of the tree that will not bend down with fruit load later in the year or be dislodged by wind. The border of the orchard may be treated at the label rate unless it is bordered by another mating disruption block. The interior may be treated at a lesser rate if the codling moth pressure is known to be low. Known high-pressure locations in an orchard should be treated at the full label rate. Borders adjacent to bin storages should be closely monitored and supplemented with sprays as needed.

The pheromone dispensers should be placed in the orchard in as uniform grid as possible. In orchards that have trees of uneven size, place the dispensers in the larger trees to maintain pheromone height. The pheromone is heavy and will settle and flow into the space occupied by the smaller trees. Placing the dispensers that would have been used in the smaller trees into the adjacent mature trees has successfully protected two to four row renewal areas within older orchards. Larger areas of bearing young trees must have the dispenser placed as high in the tree as possible, or attached to the trellising structure above the tree. Do not place the dispenser on the trellis wire, the wind will move it down the wire and destroy the uniformity of the placement.

In orchards with uniform slopes, increase the dispenser density on the upper side (1/4 - 1/3) of the slope and reduce the density on the lower side by a corresponding amount. In orchards with rolling terrain, shift some of the dispensers from the low area onto the surrounding ridges.

Monitoring traps should be placed in the orchard at the same time as the pheromone dispensers, they must be in place by full bloom. The traps must be placed as high in the tree as possible, never in the lower 1/2 of the canopy. Place the trap 5 to 6 feet away from the nearest pheromone dispenser if possible. Some sort of removable hanger should be used to ease trap service if the trap cannot be easily reached without a ladder.

Trap locations should be clearly marked with a bright, non-fading ribbon (orange and pink are best) in the tree, around the base of the tree, and at the end of the row. A trap that is very visible in May can be completely invisible by early July, or if approached from a different direction.

The traps should be properly assembled to provide the opening as it was designed. Improperly assembled or weathered traps may have the opening reduced enough to restrict entry or be so open the moth does not contact the catching surface.

The density of trapping varies with block size and uniformity. Large uniform blocks of 40 acres or more may be adequately monitored with 5 to 10 acres per trap on a uniform grid. Smaller blocks will require proportionately more traps to adequately monitor codling moth presence. Additional traps should be placed in known high-pressure locations and at borders where exposure to pressure is suspected. Traps placed for border monitoring should be placed on the outside of the second row to be effective. Some of the border traps should be standard 1x strength, the 10x lure may not be attractive if the pheromone level is low on the border.

The initial 10x lure normally lasts 3 weeks until mid June, after those lures must be changed every two weeks to insure viability with warmer weather. All spent lures MUST be removed from the orchard to prevent false attraction points. The trap bottoms must be kept in a 'fresh' condition by stirring or replacement, as the catching surface becomes dirty from dust and insect catch.

One or more standard lure traps should be placed in an untreated location with similar exposure conditions to establish biofix. This is necessary to determine the proper timing of any chemical controls that might be needed. If no moths are caught use full bloom on Red Delicious as biofix.

The traps placed for biofix should be monitored on a 1 - 2 day schedule beginning at early bloom until the first sustained catch is recorded. The traps in the orchard must be monitored on a regular weekly schedule beginning one week after biofix and continuing through the second generation of codling moth late in the summer.

Complete chemical control of the first generation should be standard operating procedure for the initial year of mating disruption. Apply the first cover at 1-% egg hatch as determined by the Codling Moth degree-day model for that location. Reapply after rainfall, a consistent cover throughout the first generation is imperative to lower the internal codling moth pressure for the succeeding years and allow the technique to become economically successful.

After the initial year of complete control, a commonly used threshold for chemical treatment in a mating disruption block is a cumulative catch of 4 or more moths in a trap during the 4 - 5 weeks of the first generation, and 2 moths caught in a trap for the second generation.

Visual monitoring for fruit damage at the end of the first generation when the larva will be large enough to spot easily is important. Concentrate on borders, areas around bin, prop or brush piles, large trees in interplanted areas, etc.

Fieldmen working with mating disruption blocks should make it a priority to ask the grower or the individual responsible for the traps for the latest trap counts and trap maintenance schedule. That data should be recorded for possible later statistical use.

## Sanitation

Burn all stump piles, brush piles every spring to destroy any overwintering codling moth larva. If props are no longer being used as a cultural practice, remove them from the orchard border also. Remove all uncontrolled 'wild' trees and regrowth that you are responsible for. Contact your County Pest Control Board for help with uncontrolled trees outside your property. Spray a 3 to 4 row border around any active bin storage area, do not spread bins into the orchard until immediately prior to harvest to avoid 'seeding' codling moth larva through out the orchard.

## Dormant Zinc Sulfate

Dormant Zinc Sulfate applications are a tried and true method of getting needed zinc into your fruit trees. Dormant Zinc Sulfates are applied after the buds begin to swell in the spring, but before any volume of green tissue is exposed to avoid possible leaf and crop damage. It is important that the following conditions be observed. Apply at 40 degrees or higher to allow for good drying, allow time for all of the spray to be dried on the tree before the temperature drops to near freezing, and at least 5 days must elapse between Zinc Sulfate and an application of spray oil.

A note about materials. We no longer handle liquid Zinc Sulfate. It comes associated with many handling and storage problems plus it is highly corrosive to equipment. The Super Tel Zinc that we now sell is a fine, almost powdered granule that readily dissolves in cold water unlike the old style Zinc Sulfate crystals. We believe this is much easier for both of us to handle, especially in small quantities.

A full program of foliar zinc with Tech-flo Zeta Zinc or another similar high-grade product should carry you through the season unless you have already developed a Zinc deficiency from past programs. I have written all of the delayed dormant through post bloom sprays in this bulletin with a foliar zinc included except for Apricot, Peach and Nectarine. Many growers use this program in addition to any dormant Zinc Sulfate applications they are able to get on.

## Apples

### Delayed Dormant to Petal Fall

The first spray of the season is normally Zinc Sulfate as the buds begin to swell but this year maybe not, see the Dormant Zinc article elsewhere in this bulletin. If you can apply it, use Super Tel Zinc @ 5 - 10 pounds per 100 gallons of water, 400 gallons per acre. This material dissolves readily in cold water. Use the lower rate if green tissue begins to show rapidly. Allow 5 days between dormant zinc and an oil application.

**Delayed-Dormant** (San Jose scale, European red mite, Green apple aphid, Rosy apple aphid, Pandemis leafroller, Grape mealybug, Cutworms, Mildew)

- Volck Supreme Oil 1 1/4 - 1 1/2 gal./100 gal.
- Lorsban 4E 1-pint/100 gal.  
or Dimethoate 2.67\*\* 1 pint/100 gal
- + Rubigan EC 2-3 fl. oz./100 gal.

- + Tech-Flo Zeta Zn 22 1-pint/100 gal.
- + B-17 (Dry Boric Acid) 1 - 1 ¼ lbs./100 gal.  
or Liquibor 1/2-1 pint/100 gal.

Apply this spray at 400 gallons per acre from 1/4 inch green to 1/2 inch green stages. For the best green apple aphid control this spray should be applied before the aphid begin to hatch. If pandemis leafroller or grape mealybugs are a target, **Lorsban 4E** should be the product of choice. Do not apply oil sprays within 5 days of zinc sulfate. Temperatures should be expected to be in mid-40's or above on days oil is applied. Shut off early enough in afternoon so the last tank will have plenty of time to dry before evening. Use **Rubigan EC** in this spray on varieties highly susceptible to mildew.

\*\* If early season Lygus bug control is needed and Leafroller populations are not extreme, use **Dimethoate 2.67** for an early delayed dormant for the Lygus and use **Lorsban WP** in the prebloom for the Leafroller. Leaf roller damage early in the season will not reduce the crop unless the population is extremely high. **Dimethoate 400** is not labeled for pre bloom applications.

On mildew susceptible varieties or if a scab infection period occurs, additional protective sprays may be needed between bud burst and bloom. **Rubigan EC** or **Procure 50 WS** @ 8 oz. per acre may be used for the scab eradicator. Both will control mildew, **Ziram** or **Thiram** are good scab protectants for the next 7 to 10 days after application but will not control mildew.

Start applying **mildew** sprays on susceptible varieties (Golden, Rome, Jonathan, Granny Smith, Gala, Fuji, Braeburn, and Jonagold) at the first sign of mildew, usually at 1/2" green. Additional sprays at pink and petal fall are important in an over all mildew control program. In light mildew pressure conditions, **Microthiol sulfur** before and after bloom may be sufficient, especially if a Sterol Inhibitor such as Rubigan or Procure was used with the delayed dormant spray.

**Scab** infections may occur any time in the spring when there is green tissue and a wetting period occurs. If scab was present the preceding year, sprays should begin as soon as possible after an infection period, as determined by the Mills wetness chart, has occurred. Rally, Rubigan, and Procure and Vanguard are eradicator type sprays with "kickback" action, whereas, Lime-Sulfur, Sulfurix, Ziram and Thiram are all protectant type fungicides. The safest procedure is to combine a protectant with any eradicator materials that are applied. Vanguard at 3 oz./acre is a protectant material, at 5-oz./per acre it will also provide 48 hours of "Kickback" protection. **The Mills Chart is on page 21 of the 1999 WSU Crop Protection Guide, or you may get a copy of the chart at any Northwest warehouse.**

#### PRE-BLOOM (Apple scab, Apple mildew)

- Rally 40W 1 1/4-oz./100 gal.  
or Rubigan EC 2-3 oz./100 gal.  
or Procure 50WS 2-3 oz./100 gal.  
or Lime-Sulfur Solution 2 1/2 gal./100 gal.  
or Sulfurix 2 qts./100 gal.  
or Dithane (scab only) 1 1/2 lb./100 gal.  
or Ziram 76 WDG (Scab only) 1 1/4 lb./100 gal.  
or Thiram 65 (Scab only) 1 1/2 - 2 lbs./100 gal.  
or Vanguard (Scab only) 3 to 5 oz./per acre

Rates shown are for 400 gallons per acre application.

**PRE-PINK TO PINK** (Pandemis leafroller, Lygus bug, Cutworms, Grape mealybug) Apply when populations warrant treatment. If you had any leafroller damage at harvest time last fall, this spray is important for control of that insect!

- 1). Lorsban 50WP 3/4 lb./100 gal.

If **Lorsban** was used in either dormant or delayed dormant, use Bt materials (Crymax or Dipel) at pink and petal fall for resistance management. **Lorsban** may russet susceptible varieties if the drying conditions are poor or applied following cool wet weather.

- 2). Guthion 50WP 3/4 lb./100 gal.  
(Guthion will control grape mealybug.)

- 3). Crymax 3/8 - 1/4 lb./100 gal.  
+ Nu-film 17 8 oz./100 gal.

Dipel (Abbott)  
+ Nu-film 17

1/4 lb./100 gal.  
8 oz./100 gal.

Rates shown are for 400 gallons per acre application.

Crymax or Dipel (Bt materials) will control pandemis leafroller with good coverage and warm nighttime temperatures. Daytime temperatures should be 65 degrees or higher. Control will be poor under cool or wet conditions, wait for favorable conditions or your cost and effort will be mostly wasted! Two or more applications may be needed during the pre bloom to 1/2 inch green fruit stage for good control of the first generation if leafroller or leafroller damage was easy to find the previous harvest. Nu-film 17 will help with coverage and has some sunscreen abilities. A feeding stimulant such as **Coax** or **Entice** may improve the effectiveness of the Bt material. Coax has a built-in sunscreen and sticker. Check the label for the proper rates at the gallonage you will be spraying.

**PINK TO PETAL FALL** (Western flower thrip, Campyloomma)

- Carzol SP 1/4 lb./100 gal.  
+Tech-Spray Mg 1/4 pint/100 gal.

Rates shown are for 400 gallons per acre application.

If blossoms are open, apply at night or while bees are not working in blooms. Repeat application as needed. See separate articles for Campyloomma and Western Flower Thrip monitoring and control during bloom.

## Apricots

### Dormant to Shuck Fall

Apricots in most locations probably have the least demanding pest control program of any commercial fruit grown. In many locations Peach Twig Borer is the only pest of consequence. Once Twig Borer is established in an area just a few abandoned back yard trees it can infect a wide area, the moths are strong fliers.

Apricot trees are not frequently affected by scale insects, but if that is a concern start the control season with a semi-dilute to full dilute spray with **Volck Supreme** oil @ 1 gallon/100 gallons plus **Diazinon 50WP** @ 1 lb./100 gallons applied between stages 2 & 3 on the WSU bud development chart.

Twig Borer will not be controlled by the oil/diazinon spray, to do that apply **Thiodan 50 WP** @ 4 lbs./acre at bud stage 4. If you do not have or have not had scale in the orchard, this should be your first spray for the season.

A second Twig Borer spray will be required after bloom at bud stage 7 on the bud development chart. Use **Azinphos Methyl 50W** @ 2 lbs./acre, use full dilute and increase the **Azinphos Methyl 50W** to 3 lbs. to control Grape Mealy bug if they were present the previous harvest season. If this spray is delayed to bud stage 8, some of the Twig Borer larva will have entered the twigs and will survive to develop a summer generation. I will address monitoring and control of the summer generation in a later issue.

If Grape Mealy bug are present a second application of **Azinphos Methyl 50W** @ 3 lbs./acre should be made 10 to 14 days after the first. This may time well with the shuck fall spray (stage 8) applied for Perfection Spot as mentioned in the next paragraph.

Be prepared to apply **Rally 40W** @ 5 oz. or **Orbit** @ 4 oz. per acre for prevention of Perfection Spot at stage 8, i.e., just as soon as the largest fruits are mostly free of the shuck. Don't wait for the smaller fruit, they will eventually fall or be thinned off of the tree. In climates where spring rain showers are common, combine **Captan 50W** @ 5 lbs./acre for a protectant. Repeat in 14 days to cover the new growth and enlarging fruit.

If you plan to ship apricots to either Canada or Mexico you will need to monitor for Oriental Fruit Moth beginning by the first of April. Contact a fieldman or warehouse for a copy of the protocol.

## Cherry

### Delayed Dormant to Petal Fall

Mite problems have become more of a concern for cherry growers in the last two or three years. I know of many cherry growers that have not applied dormant or delayed dormant oil for several years to avoid possible tree injury and the resulting delay of bloom on weaker spurs. If you would like to avoid a delayed dormant oil, the following items must be taken into consideration. Otherwise use the standard materials listed on the next page.

If your mite problem was mostly European Red Mite and there is a good population of eggs on the spurs, you can get control for them with a dormant to delayed dormant application of **Apollo @ 6 to 8 oz.** per acre. If your mite problem was McDaniel or Two Spotted mite, delayed dormant oil won't give you much control, they overwinter mostly on the orchard floor and are not up in the tree yet at the delayed dormant timing. By waiting until you can find them moving up the trunk as the buds begin to break on the back side of the leaders low in the tree, then spraying with 1 1/2 gallons of **Volck Supreme Oil** plus 1 pound of **Diazinon 50 WP** per 100 gallons on the lower part of the tree where the mites are, you should get good control and avoid the risk of prolonging the bloom with oil damage.

If you have any San Jose Scale you **must** apply a delayed dormant oil, there is no other control option. The Black Cherry Aphid is generally controlled by any post bloom Guthion, Thiodan or Diazinon that you apply. Pre harvest the Black Cherry Aphid will be controlled by the first Guthion 50W applied for Cherry Fruit Fly if the weather is warm and dilute application is used.

Leaf roller is one pest of Cherry that seems to have an increasing population, mostly because early season controls have been very light or non-existent. A delayed dormant of **Lorsban 4E @ 1/2 gallon** per acre with or without oil applied full dilute and paying particular attention to the inside and top coverage of the tree is the foundation for any later control measures you may take.

So, do you need a delayed dormant?? If you have San Jose Scale definitely yes. If you have no scale, and want to avoid an oil application, use the methods listed above to control the mites, you should do OK.

If you apply a delayed dormant include some Zinc and Boron for early season bud growth.

#### **DELAYED DORMANT MATERIALS**

Volck Supreme Oil	4 gallons per acre
Lorsban 4E	1/2 gallon per acre
Tech-Flo Zeta Zinc	1/2 gallon per acre
B-17 (Dry Boric Acid)	4 - 6 lbs. per acre
Liquibor	1 quart per acre

Rates shown are for 400 gallons per acre application. Decide which is best for you based on the preceding discussion.

**PRE BLOOM** (bud stages 5 - 7, not past stage 6 if mealy bug materials are going to be applied.)

**Crymax @ 1 to 1 1/2 lbs.** per acre **IF** the weather is warm, i.e., 65 degrees during the day. Otherwise wait until post bloom, warm weather is essential for good performance of this material.

**Diazinon 50 WP @ 4 lbs.** per acre for any Grape Mealy Bug, spray before the bloom is open.

**Microthiol Sulfur @ 10 - 12 lbs.** /acre will protect the green tissue it is covering if there is a mildew infection period during bloom, most years it is too cool to be of much value.

**Nutra-Phos Super K @ 12 lbs., Sorba Spray Mg @ 1 pint, B-17 (Boric Acid) @ 4 - 6 lbs.** or **Liquibor @ 2 quarts, Zeta Zinc @ 2 quarts** combined with 10 to 15 lbs. of spray grade **Calcium Nitrate** will help maintain the rapid cell division which is critical for large, uniform ripening fruit. There is some indication that using Calcium Nitrate in place of Urea for the nitrogen increases fruit firmness, either may be used, use Urea @ 5 to 6 lbs. per acre.

Spraying during the bloom period is essential if you are in an area that has Brown Rot conditions, i.e., rain during the blooming period. **Orbit @ 4 oz.** per acre, **Elite @ 8 oz.** per acre, or **Rally 40W @ 5 oz.** per acre are good materials. A minimum of two sprays are needed at this time for Brown Rot control, more will be needed in the fruit ripening period.

Cherry Powdery Mildew conditions, like Apple Scab and Fire blight must be monitored and projected for each individual location. You as the owner/manager are the only individual capable of consistently and reliably doing that. Don't depend on a fieldman, he or she may be 100 miles away working under very different conditions. (Note the following article for monitoring guidelines.)

## 1999 CHERRY MILDEW PROGRAM

Each year the researchers bring us closer to a verified Cherry Mildew model. Dr. Grove of the TFREC in Wenatchee is urging the use of the Mills Chart for Apple Scab, suggesting that a moderate infection period as defined by that chart be considered the threshold for taking preventive measures i.e., applications of a Sterol Inhibitor.

Dr. Grove's findings of 4 hours of wetting at 50 degrees Fahrenheit needed for spore release plus an additional 12 hours of wetting for germination falls closer to a light infection period than to a heavy infection period. **To err on the side of crop safety Northwest Wholesale is recommending you use a threshold of a light Apple Scab infection plus 10% if your control program is based on Sterol Inhibitor materials.**

**Sterol Inhibitors**, (SI materials) called eradicant compounds because they have the ability to kill or retard established infections. Effectiveness declines after 24 hours, very little control should be expected after 96 hours. **Elite, Orbit, Rally DF** and **Rubigan EC** are the only materials currently registered on cherries. Mildew resistance to Rubigan EC has been documented in some locations, Rally as been reported to have about a 40% cross resistance factor with Rubigan, base your material selection on the mildew control history of the orchard in question.

**Protectants**; these materials must be in place before the mildew becomes established, they have little to no effect on active mildew. **Microthiol Sulfur** (micronized sulfur) and **Sulforix** (Orthorix) are most effective when tank mixed with SI materials. Sulfur and sulfur based compounds work best in temperatures above 70 degrees. Do not apply when temperatures are forecast to be above 90 degrees to avoid leaf and fruit burn.

**Broad Spectrum Fungicides**; these are the older materials acting against a wide range of fungi. **Benlate** and **Captan** are the only materials currently being used. Use them only once per season as a resistance management strategy. Check with the fruit warehouse to determine that their marketing program will accept it. Use earlier in the season, i.e., GA time or before, to reduce the possibility of measurable harvest residue.

**Stylet Oil** has been used long enough to prove that it is an excellent mildew eradicant. There is danger of fruit marking if it is used after the fruit begins to change from dark to light green. To avoid this, Northwest Wholesale Inc is recommending two applications at ½ 1 gal. /100 gals. (1/2% - 1-%) beginning post bloom after the first infection period or whenever the first mildew colonies are found in the lower center of the tree, with the second application 14 days later. If the second application would be at or near the normal timing of the GA application, do **NOT** use oil, use a sterol inhibitor instead.

Thorough coverage of all of the foliage is critical, fully developed orchards will require 150 to 200 gallons for good contact. **Do not use wettable sulfur within 14 days of an oil application, do not use a micronized sulfur within 10 days of an oil application.** For practical purposes this means that no sulfur would be used in the orchard until 14 days after the final oil application because the value of sulfur during the prebloom and bloom period is normally minimal due to the cool temperatures.

To reduce the mildew pressure for the following year, apply a 1-% solution of oil as soon after harvest as possible at 200 gallons per acre. This will also have the benefit of reducing a mite population and may avoid other post harvest control of that pest. For heavy mildew pressure or a high population of adult mites a second application may be needed about 10 days later. We do not know if oil is compatible with Dimethoate yet, so if you want to try that combination, limit it to a small plot.

**Organic Fatty Acid Salts.** **M-Pede** kills on physical contact, but carries some of the same risk of fruit marking as the Stylet Oil. Wetting the tree enough to form droplets of excess spray material may mark smoothed skin fruit. Coverage has to be complete and uniform to get control of the mildew, but wetting to run off must be avoided. The most logical application times would be about shuck fall and post harvest to reduce the spoor count for the following year.

Material use rates;

Benlate WP	1 1/2 - 2 lbs./acre
Captan 50 WP	4 lbs. /acre
Elite 45 DF	6 - 8 oz. /acre
M-Pede	1 - 2 % Solution

Microthiol Sulfur	10 - 12 lbs./acre
Orbit	4 oz. /acre
Rally DF	5 oz./acre
Rubigan EC	8 - 12 oz./acre
Stylet Oil	1-% solution (see comments.)
Sulforix	2 qts. /100 gal.

All of these materials are contact only, complete coverage of the foliage is very important. 100 gallons per acre has not proven successful in full sized trees after they are well leafed out i.e., post bloom or later, use 200 to 400 gallons per acre when controlling mildew.

## **Peach & Nectarine Dormant to Shuck Fall**

Green Peach Aphid must be controlled pre bloom to avoid fruit marking and summer mite problems. Apply **Volck Supreme** oil @ 1 gal./100 gallons plus **Asana** @ 2 - 3 oz./100 gallons at bud stage 2 on the WSU bud development chart. Apply high gallonage, the spray solution must flow into the bud structure and contact those aphids that might be sheltered behind it or even inside the more advanced leaf buds. Applications delayed past bud stage 3 will result in poor aphid control and will most likely require a repeat application later in the season with probable mite problems being added to your aphid problems. Asana pre-boom is also the first Twig Borer spray.

The second twig borer spray is **Thiodan 50W** @ 4 lbs./acre applied at post bloom or petal fall (bud stage 7) depending on the variety. Add **Microthiol Sulfur** @ 10 lbs./acre for Nectarines and any mildew susceptible peaches. If this spray is delayed to bud stage 8, some of the Twig Borer larva will have entered the twigs and will survive to develop a summer generation. I will address monitoring and control of the summer generation in a later issue.

Nectarines will follow the same spray schedule except they will need **Carzol SP** @ 1 lb./acre early in the bloom period to control Western Flower Thrip (see separate article for Thrip detection). When bloom is present this material must be sprayed either late in the day after the bees have left the orchard or early enough in the morning to be completely dry before the bees begin foraging. Orchards with lots of blooming weeds in the cover crop or adjacent fields may need a petal fall Carzol also.

When the shuck has fallen, Nectarines and mildew susceptible Peaches should be protected with Rally 40W @ 5 oz./acre.

## **Pears**

### **Dormant to Petal Fall**

Dormant **Zinc Sulfate** @ 20 to 40 lbs./acre on pears must be applied early, there has to be 5 days between the zinc and any oil applications. If you are planning on two oil/sulfur sprays to lessen the Psylla egg pressure on later materials, any Zinc Sulfate sprays have to be done by bud stage 1 on the WSU bud development chart. An aggressive foliar program with **Tech-Flo Zeta Zinc** or a similar material will keep you out of a zinc deficiency situation if a dormant zinc is not possible this year. (See separate article on dormant Zinc Sulfate on page 5)

To delay Psylla egg deposit and compress the first generation, apply **Volck Supreme** oil @ 4 gal/acre plus 10 - 12 lbs./acre of **Microthiol Sulfur** as soon as the first strings of 3 or more Psylla eggs are detected, usually between stages 1 & 2 on the WSU bud development chart. Use enough water to cover everything thoroughly!!

Apply a second **Volck Supreme** oil @ 2 - 4 gal/acre 7 - 10 days later, but not later than stage 3 on the bud chart. Use the lower rate if the weather has been cool. Add 10 - 12 lbs./acre of **Microthiol Sulfur**. If we do not get an Insect Growth Regulator such as **Esteem** or **Dimilin** this year to control the Psylla nymphs between cluster bud and petal, be sure to include 3 qts. of **Thiodan 3EC** to kill the adult Psylla, 2 qts. of **Lorsban 4E** for San Jose Scale, Leaf rollers and Grape Mealy bug. **B-17 (Boric acid)** @ 4 - 6 lbs./acre, or **Liquibor** @ 2 qts./acre and **Tech-Flo Zeta Zinc** @ 2 qts./acre should be added for strong flower development.

For a single prebloom oil/sulfur, wait a little longer for the first spray, until egg chains are fairly easy to find but no later than early stage 3, then apply the second spray listed above but increase the **Volck Supreme** oil to 6 gal/acre.

The drying conditions must be good in all oil applications, allow time for the spray to dry completely before the temperature begins to drop.

If either Dimilin or Esteem has a label by the time we need it, we are recommending that Esteem be applied at first egg lay approximately bud stage 1. Dimilin appears to work well when applied up to bud stage 3.

Immediately prebloom apply **Procure 50 WS** @ 8 oz./acre for mildew control, **Carzol SP** @ 1 lb./acre if Lygus Bugs are active, it will control Pear Rust Mite also. Add **Dithane** @ 8 lbs./acre to the Procure/Carzol mix for control of the first instar of the Psylla nymph. Add **Diazinon 50W** @ 4 lbs./acre for Grape Mealy bug control. **B-17** or **Liquibor** and **Tech-Flo Zeta Zinc** should again be added for strong flower development @ 1/2 gallon each per acre.

Petal fall timing is important for Grape Mealy Bug and Alfalfa Greening control and additional mildew control, especially if the weather has been wet or there are mildew susceptible apples nearby. Use **Guthion 50W** @ 3 lbs./acre (**Imidan** or **Diazinon WP** at full rates are also acceptable) plus **Nutra Phos 24** @ 12 lbs./acre or **Nutri-Cal 8%** at 1/2 gal./acre for the calcium source. **Dithane** @ 8 lbs./acre for fruit finish may be included now, this is as late as you can use this high rate. There is no benefit to waiting until Psylla nymphs are found to apply a post bloom **Agrimek** because the efficiency declines as the foliage matures, later applications do not extend control any later into the season than petal fall applications. Apply **Agrimek** @ 20 oz./acre along with 1 gal./acre of **Volck Supreme** oil or another high quality spreader as soon after bloom as possible to clean up any Psylla nymph that have developed during the bloom period. A possible alternative to the petal fall **Agrimek** would be a petal fall **Pyramite** @ 8.8 oz per acre also with 1 gal./acre of **Volck Supreme** oil. It is a contact material only, but good coverage should be relatively easy this early in the year, it also should control any adult Psylla that have survived pre-bloom applications. This would allow for a single summer use of Agrimek for both Psylla and Mites and perhaps slow the development of insect resistance to both materials.

## Campylomma

The adult Campylomma are attracted to the orchards in late summer to feed on aphid, they lay eggs in the bark of the apple or pear trees to overwinter. The nymphs emerge during apple bloom and feed on the developing fruit when there is not enough soft-bodied insects to satisfy them. Golden Delicious and Gala may be damaged at an average of less than 1 nymph per tray, Red Delicious seem to tolerate 4 to 5 nymph per tray.

To monitor for Campylomma you will need a dark colored catch tray, (the Psylla catch trays we sell are light on one side, dark on the other) a short section of broom handle or stiff rubber hose for a beating stick, and either a 10x or 14x magnifying glass or very good eyesight!! Hold the catching tray about 6" below a fruiting branch, strike the branch sharply two or three times with the beating stick. If there is a lot of debris on the tray after beating the limb, turn the tray over gently, most of the debris will fall off. Do not jar the tray or the insects you want to count will fall off also.

The Campylomma nymph will look like a miniature aphid, rounded abdomen, pale greenish yellow to nearly clear, antenna pointing forward, often it is moving rapidly, especially at temperatures above 65 degrees. You may also find some apple grain aphid, they will be larger, darker green with orange markings at the base of the cornicles if you use your glass, and very lethargic, most barely moving. If you knocked loose some white apple leafhopper nymph they will be a very pale yellow to nearly clear, very slender in shape with antenna pointing to the side and curving to the rear, and a segmented abdomen under your glass. They also will move, but not as rapidly as the Campylomma nymph will.

Campylomma populations are spotty, check any areas where you had aphids late in the previous summer that were not serious enough to control, boundaries of the orchard that were bordered by succulent plants or mullein early in the fall of the previous year.

Emergence of Campylomma is weather dependent, populations can appear and become damaging very rapidly. You should monitor every three to four days from prebloom to 2 weeks after petal fall. Some orchards did not detect Campylomma nymph until after petal fall last year. Controls were not applied because it was felt that the fruit was too large to be damaged, that turned out to be a mistake. Campylomma will feed on quite large fruit if there is no other food source available.

If a damaging population of Campylomma is found, control immediately using **Carzol SP** @ 1 pound per acre. The spray must be dried before bees begin foraging in the orchard.

## Western Flower Thrip

Western Flower Thrip are potential problems on Fuji, Braeburn, Granny Smith and Nectarines, where they cause a white “Pansy Spot” on the apples and serious skin damage on Nectarines. Thrip are very small, dark, slender and very active. A common shelter and food source in the orchard is the dandelion, from there they can fly to the fruit blossoms. A hillside full of Balsam flower will also host thrip.

Searching for the insect is time consuming. In the case of apples the interior flower parts must be pulled apart or removed to disturb the insect from hiding. It will run quickly to the next shelter or fly away. In the case of the nectarines the flower must be opened to expose the base of the ovary (that portion of the flower that will become the fruit), all the while watching for the moving insect.

With either of these crops, I would simply control the pest early in the blossom period with an application of **Carzol SP** @ 1 pound per acre. This spray would also control any potential *Campylopus* or *Lygus* bug threat. The spray must be completely dry before any bees begin to forage in the orchard.

## Fire Blight

Fireblight is an incurable disease, all control efforts must be directed toward sanitation and prevention. If you had fire blight strikes last year, be certain that all over wintering cankers are removed from the orchard. Two inspection tours a week or so apart between tight cluster and first bloom is a good program. As the trees start growing active cankers will begin oozing and the bark on the lower side of the canker will become dark and wet. Make the second inspection tour going in the opposite direction from the first.

The fire blight bacteria require warmth to multiply and will not reach dangerous levels without a couple of days of sunbathing type weather. After this level of danger has been reached, any free moisture (dew, brief shower, spray application, etc.) that is capable of moving the bacteria into the nectaries in the center of the flower could cause an infection. Use the “Cougar Blight” risk model developed by Tim Smith to determine your risk level and properly time your sprays. Copies of the model are available at any Northwest warehouse.

**Mycoshield** (*not on apples when this was written 2/25/99*) is the only material proven to be effective against Fireblight infection. It must be applied @ 1 lb./100 gallons, at 50 to 100 gallons per acre so that every open blossom is lightly misted either just before or as soon as possible after the rain shower or whatever caused the free moisture. If an infection gets started, Mycoshield will not stop it, application more than 24 hours after the shower probably won't do you much good. Do not apply Mycoshield when the risk level is below the proper threshold for your orchard, protection lasts for no more than three days. Frequent unnecessary applications will develop resistant bacteria more rapidly than is necessary because of the repeated exposure to the control material.

Should you use **Blightban** to prevent the development of the fire blight bacteria?? Possibly. Blightban is competitive, not antagonistic. It requires open blossoms and the same weather conditions as the fireblight bacteria. The objective is to allow Blightban to colonize the flower parts before the fireblight bacteria. When applied at 10% and 80% of bloom under proper weather conditions the risk of fireblight will be reduced by approximately 50%. Mycoshield still must be used in the event of an infection, however the disease should be held at a lower level than using either material alone. That would be significant in high-risk blocks, I doubt that it would be significant in low risk orchards, i.e., little or no fire blight last season.

**Blightban** is a living product and is stored and transported frozen, it can not be returned. If you want to use the product, the minimum package size is 2 acres, we will need at least 48 hours to get the product to the warehouse nearest you.

## Chemical Frost Protection

Frostgard increased the cold tolerance of green tissue a few degrees by reducing the numbers of bacteria on the surface of the plant. Ice forms at higher temperature in the presence of bacteria than it does when bacteria are absent. Maximum effect is about 48 hours after application. New tree growth and bacterial multiplication require retreating at about 10 days. We had 25 acres worth of Frostgard in inventory when this was written, it is no longer being manufactured. An alternative would be applying a micronutrient mixed as described in **Nutrient Technologies**

**Technical Bulletin No. 8.** If copies are not available at the nearest **Northwest Wholesale** warehouse, call me for a copy.

## **Soil fumigation and spring tree planting**

Tim Smith has documented several trials that prove emphatically that replanting in old orchard soils without fumigation is a foolish financial risk. This holds true also when planting must be delayed to accommodate spring fumigation.

If you have to fumigate this spring, arrange for the nursery to hold and store your trees for you, they can do a better job of that than you can. If your trees are coming from an out of state nursery and you can't delay delivery, arrange for good storage. Vacant fruit cold storage rooms are NOT good storage. The residual ethylene contained in these rooms or mixed in from adjacent active rooms will weaken or destroy the buds on your new, high priced trees. Find a facility that will keep your trees dormant or near dormant without drying them out.

Homegrown nursery trees are even more difficult to handle properly when planting is delayed. They must be dug before the buds begin to swell to avoid severe transplanting shock. If they can't be replanted immediately you should arrange for proper storage for them also.

Copies of Tim Smith's fumigation guide are available at any Northwest warehouse.