

GROWER FIELD GUIDE, March 2009

I can hardly believe that spring is just around the corner. I have been busy this winter with many different meetings and even some new meetings for 2009. For those of you that attended the apple, pear and stone fruit day at the convention center you are aware of the new addition of apple day. I think it was successful and most of the people I talked to liked it. Winter is always hectic with trying to get credits and also to make sure pruning is getting done correctly, so it is nice to spend a day learning a little.

The weather just doesn't want to give up winter yet. It is snowing this morning while I am writing this letter. I think that many of you have gotten ready for the new season and are waiting for the spring to begin, for those of you who aren't you are getting a little extra time from Mother Nature. Keep in mind that time will continue and spring will show up, so catch up as soon as possible.

I will probably always start the March edition of the Grower Field Guide with the same disclosure that has been in it for a long time. I think it states our mission as clear and precise as it can, and I think that Herb nailed it with his statement.

Our intent at Northwest Wholesale, Inc. is to help you grow the best possible fruit that you can. Quality is the driving force for higher returns on your investment. With a shrinking market of buyers return business is more and more important. As an industry we need to provide quality fruit that delivers with no problems to maintain good business relationships and profitability.

For many years Northwest Wholesale has set the market for orchard supplies in North Central Washington. The prices you pay for growing supplies are lower because of Northwest Wholesale — no matter whom you trade with. Here's why. First, we operate as economically as possible. We know it is your money running the business. Second, we price as close to cost as economically possible — we don't search for the highest level the market will tolerate. Therefore everyone else dealing in our market area has to adjust their prices to our level to compete for your business. So you're already saving just because we're in business. Finally, all of the profits are eventually returned to you in the form of patronage dividends.

You can help us do even better. Our costs are directly related to volume. The more volume we handle, the lower our costs are. Higher volume means we can buy at better discounts for you. And it costs less per pound or ton for us to handle larger volumes. The more you trade with us, the better overall pricing you will receive in return.

You no longer can limit your concerns to selecting the least expensive material to kill the insect pests in your orchard. The relatively inexpensive, broad spectrum materials are mostly history, now you have to select from a much longer list of more selective materials and consider their impact on the other insects in your orchard that may be benefiting you either directly as predators or as a food source for predators you want to maintain. There is good news though. There are more new materials this year than last.

We also have to deal with that complexity as we anticipate the season and begin placing orders for supplies. It is impossible to have some of everything for everybody. Therefore we are stocking a good selection of what we believe to be the best performing and most economical to use products available to us. If you require something we don't have we will make every effort to acquire it for you as quickly as possible.

Cholinesterase Monitoring

You are required to provide for cholinesterase monitoring for all employees handling category I or II organophosphates or N-methyl-carbamates. These labels carry the signal word POISON or DANGER. All individuals covered by L&I insurance (including owners) are covered by this rule. *Any employee, including the owner may decline to participate after consultation with a qualified medical practitioner.* Participating employees must have a baseline blood test before any exposure to the covered pesticides. Records of the time spent handling any of the covered pesticides must be kept for every employee participating in the program for seven years. When the employee reaches a threshold of **thirty** hours of exposure, not fifty, as in the past. They must have a blood test within three days. I do not read anywhere in the rule where you must keep exposure records for employees who have declined to be monitored. My opinion does not agree with the public statements of either the Farm Bureau or L&I, so you might want to run that past your friendly family lawyer before the start of the season. A complete copy of the rule is available at <http://agr.wa.gov/PestFert/Pesticides/WorkerProtection.htm>.

Are you managing your codling moth problem or controlling it?

Ok, I know this has been printed for the last two or three years, I am guilty of leaving it the way that Herb wrote it. I still feel that it is as important today as when he wrote it. My goal in leaving this in the March letter has been that repetition will lead to driving the message home. When we choose to be reactive to the problem that we have with codling moth we are part of our problem. Make a plan and stick with it. Monitor the problem and know what you are going to do before hand.

On the other hand, growers and fieldmen who are intent on controlling codling moth pay attention to the phenology model, spraying practices i.e., timing and coverage and then spend the money when the population is smallest and weakest, i.e., first generation, don't seem to have much problem, regardless of the methods of control they chose to use. Tim Smith has consistently said that you can't manage codling moth; you must control it. "If you only have a single larva per 1000 fruit, you still have 80 to 140 wormy apples per acre. You can't tolerate that and stay in business." One percent fruit damage may lead to one hundred percent economic loss for the grower. Slowing down the packing line to sort out the wormy fruit is more expensive for everyone involved. Missing a single wormy apple and shipping it to a politically sensitive market could cost weeks, months or even years of lost shipments. The only sure method the packing house has to prevent that and protect it's market is to reject any lot of fruit that has wormy apples in it. Taiwan is the proof of this problem.

Are you controlling codling moth, or are you 'managing' a problem?

Regular readers of the GROWER FIELD GUIDE understand that the content will not change radically from year to year, just as your objectives in the orchard don't change i.e., growing high yields of quality fruit as economically as possible. My goal is to relate information gleaned from research, fieldstaff and manufacturers that can be put to practical use in your operation.

Organic programs are not normally published in the GROWER FIELD GUIDE but we have them available. If you want a copy call or email me and I'll get it to you. All of the Northwest Wholesale spray programs and past issues of the GROWER FIELD GUIDE are posted on our website www.nwwinc.com.

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 rates are shown per acre except those products where concentration of material is important, those rates are per 100 gallons.

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.

Your comments are always welcome.

Nathan Squires, Field Services Manager

Telephone, 509-662-2141, Toll Free 800-874-6607, email NateS@nwwinc.com website www.nwwinc.com.

Do you have your new private applicator's license?

Your PESTICIDE LICENSE must be renewed every year. EPA strictly —\$5,500 per license violation strict — enforces the annual license renewal requirements, so don't take it personally when we ask you to show us your new license or sign an affidavit stating you have properly applied for your new license BEFORE you asked us to sell you restricted materials. We have to do this to stay in business.

Container Collection

Pesticide container recycling will be the same as last year. Bring in your empty, rinsed containers anytime during normal business hours. Northwest Wholesale will accept properly rinsed containers at all locations **except Tonasket** (Don doesn't have the room). The warehouse personnel will inspect them before acceptance. The container must be clean and dry, some staining is allowed. The plastic labels must be slipped off, the jug cap removed and any instruction booklet removed. We will also accept plastic containers up to 30 gallons in size. There is a poster on display at all participating locations with pictures and detailed instructions on container cleaning.

Speaking of containers, do you have returnable drums or totes left over from last year? Please bring them back in ASAP. Oil season always seems to demand more containers than we have available. Remember to triple rinse the drum, let it drain, then put the bung back in place. We can't accept it unless it is clean and dry inside.

Sprayer Calibration

Are you struggling with your sprayer calibration? The first item you have to address is driving speed. I can't tell you how fast you should drive, that changes with orchard configurations and the time of the year. Two miles per hour may be OK through petal fall, but too fast for summer covers when the orchard is in full leaf. If you're not getting good insect or disease control, my first guess is that you may be driving too fast for conditions. (I am assuming that the timing of the application was correct and the material was appropriate.) An easy and inexpensive way to check your current coverage is to put a 25-lb. bag of Surround WP in 100 gallons of water and spray at your normal speed. After the spray has dried completely, check to see what is not covered. If you're not happy with the coverage you will have to slow down, prune the tree differently or maybe both. Don't expect your control to improve until you do something about your coverage.

Provide us with the following information and we'll tell you how to set up your airblast or weed sprayer.

1. Travel speed, either in miles per hour or feet per minute. Engine RPM and transmission gear doesn't cut it. I prefer feet per minute because it will more accurately calculate the pressure and flow rate you will need to achieve the gallons per acre you want.
2. Tell me if it is a PTO or engine driven spray, then I will know if minor speed changes are possible.
3. Pump pressure while spraying.
4. Gallons per acre you want to apply
5. Thinning or cover sprays. (thinning sprays will be designed for the top 1/3 to 1/2 of the manifold)
6. Tree row space in feet (not required for calibrating weed sprayer)
7. Active nozzles per side. (distance between nozzles required for weed sprayer)
8. Nozzle make if other than TeeJet.

When you give me this information, either directly or through your fieldman, I will calculate nozzle arrangements for your machine, at any speed, pressure or gallonage you request. Forms are available at the warehouse counters.

Mating disruption for Codling Moth

I believe this technology has successfully moved from "cutting edge" to proven and available for any grower who wants to utilize it AND has the conditions for it to succeed. As with any technology, certain parameters must be understood and complied with to be successful. The information gleaned from most trapping programs is spotty and generalized. Attempting to detail manage codling moth from this information will eventually get you in trouble! I will attempt to summarize the basics, if you need more information call your fieldman or contact me.

Elements necessary for success

- Know your conditions, have a program — and follow it.
- Foremost is an understanding that Mating Disruption is not a robust, stand-alone control if codling moth damage was present last season. In nearly all cases it must be supplemented by chemical controls.

- There are no abandoned orchards or active bin storage piles in the immediate area.
- The orchard is not irregularly shaped with a high ratio of border and the canopy is reasonably uniform.
- Pheromone dispensers placement must be completed prior to bloom opening in Red Delicious
- Biofix, using standard (1x) lures, must be determined at a point outside the treated orchard to accurately time supplemental chemical control of the first generation.

Techniques

Dispenser Placement

The Pheromone dispenser 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 should be treated at the full 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 within an orchard should be treated at the full label rate. Borders adjacent to bin storages should be closely monitored and supplemented with tank mixes of CM-F sprayable pheromone and pesticide as needed.

The pheromone dispensers should be placed in the orchard in as uniform a grid as possible. In orchards that have been interplanted, place all 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 all of the dispensers that would have been used in the smaller trees to maintain a uniform placement grid into the adjacent mature trees has successfully protected two and four row renewal areas within older orchards. Single rows of mature trees in a replacement block with four to six rows of young trees between will be difficult if not impossible to control with mating disruption. Standard chemical control should be used in that situation.

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. Also the wire will be warmer than the tree structure and will accelerate the pheromone release rate. You might not be covered for the full season in that case.

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

Monitoring low codling moth populations in mating disruption blocks by trapping is unreliable. Managing your codling moth program from trap catch is like playing Russian roulette. Codling moth populations are never uniform unless they are very high. The trap only attracts reliably over about 4/10ths of an acre. This means that at a trapping density of one trap in 2 ½ acres you are monitoring 16% of the area. With one trap in 5 acres you are monitoring 8% of the area! A representative sample this small will not detect the presence of a small or non-uniform population. The first you will know about it will be damage showing up, usually in the second generation when adequate control is nearly impossible.

It is important to monitor low populations in suspected “hot spots” with a trap density of 1 or 2 per acre in the affected area. This provides coverage of 40% to 80% of the area and gives you a better chance of early detection.

The DA and DA+ lures, which attract both male and female should be used in conjunction with your 10X monitoring program. The combination of pear ester and pheromone seems to be more effective, especially in the second generation. The effective trapping area is similar to a pheromone lure; the comments about trap placement apply to it also

Trapping

If you have elected to monitor by trapping, the traps should be placed in the orchard at the same time as the pheromone dispensers. They must be in place before bloom to properly monitor the entire generation.

The traps must be properly assembled to provide the opening as it was designed. Improperly assembled or weathered wing traps may have the opening reduced enough to restrict entry or be so open the moth does not contact the catching surface. Either situation will render your trapping less effective and less reliable.

Delta traps are easily serviced and will retain their shape for several seasons if removed from the orchard over the winter. Mark the trap according to the pheromone used (codling moth, leafroller, etc) combining or switching pheromones will lower the efficiency of the trap.

The traps must be placed as high in the tree as possible, never in the lower ½ of the canopy. A 6-foot bamboo rod taped to the wire handle of the trap makes a very easy to use hanger and allows you to place the trap well into the top of the tree. Place the trap 5 to 6 feet away from the nearest pheromone dispenser if possible.

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 highly visible in May can be completely invisible by early July, or if approached from a different direction.

Use extended service lures. Several companies have developed lures that will last from 30 to 60 days making trap servicing less laborious. All spent lures **MUST** be removed from the orchard or buried to prevent false attraction points. The trap bottoms must be kept in a 'fresh' condition by stirring or replacement, the catching surface becomes dirty from blowing dust and insect catch.

Biofix

One or more standard lure traps should be placed in an untreated location with similar exposure conditions to establish biofix. These traps should be monitored on a 1 - 2 day schedule beginning at early bloom until the first sustained catch is recorded. 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 DAS system on the WSU tree fruit research web site is an outstanding way to monitor and set treatment windows for codling moth control.

Supplemental Control

Complete control of the first generation should be standard operating procedure in mating disruption blocks. The initial season may require two sprays unless the population is very low to begin with. Follow the recommended degree day timing for the materials you choose to use.

Visual Monitoring

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 your inspection on borders, areas around bin, prop or brush piles, large trees in interplanted areas, etc.

Fall monitoring of the fruit during or immediately before harvest to locate codling moth damage is critical for long-term success at minimum cost. There may be large areas of a block where damage cannot be found. These areas would not need a supplemental cover the following year. Any areas of the orchard that have visible damage in the fall should be treated with a full rate of pheromone dispensers and supplemental covers the following year on the first generation.

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. Bins, props, prunings must have been in the orchard during August and September to harbor overwintering codling moth larva. Brush, stumps, prop piles, etc; that have been in place outside the orchard for more than one year are "clean". Codling moth larvae do not march out of the orchard to find overwintering sites.

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.

Summary

- Use 10X traps in known or anticipated problem areas – **AT HIGH DENSITY**—high in the tree! Include some DA+ lures in your trapping scheme. This is a great way to tell what is really going on in your orchard.

- Establish Biofix as accurately as possible
- Plan to use supplemental control on the first generation if any Codling moth damage was found at harvest the previous year.
- Use the degree-day model to time any required spray (first or second generation)
- Visually inspect the orchard for Codling moth damage near the end of the first generation.

Decide whether or not to spray the second generation on economics, not aesthetics.

Inspect the bins at harvest – in the orchard – for damage and record the location. This is the information you need to improve next year’s Codling moth control program.

2009 APPLE SPRAY PROGRAM

DORMANT SPRAY (Zinc)



Zinc Sulfate *

20 – 40 lbs./acre

Apply at silver tip stage. Some green tip may be showing when finishing this spray. No zinc sulfate should be applied past the green tip stage, however, as severe foliage injury may occur. Temperatures should be expected to reach high 40's or above on days zinc is applied. Be sure and shut off early enough in afternoon so that the last tank of spray will have plenty of time to dry before temperatures begin to drop. **ph must be below 7 or product could crystallize. Always buffer water first then add zinc.**



DELAYED-DORMANT, stage 2 – 2 ½ (San Jose scale, European red mite, Green apple aphid, Rosy apple aphid, Pandemis leafroller, Grape mealybug, Cutworms, Mildew)

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|-------------------------------|---------------------|
| • Dormant Oil | 4 -6 gals. /acre. * |
| • Lorsban (Chlorpyrifos) 4EC♣ | 2 qts. /acre |
| • Rubigan EC** | 10 oz./acre |
| • Flint | 3 oz./acre |
| • Tech-Flo Zeta Zinc 22 *** | 2 qts. /acre |
| • B-17 (Boric Acid Spray) | 3 lbs./acre |

♣ Growers spraying within a stream buffer zone may substitute Esteem from delayed dormant to pink for San Jose Scale control in place of Lorsban. Intrepid at petal fall is the best leafroller control option in a stream buffer zone.

Apply this spray 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 (Chlorpyrifos) 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 last tank will have plenty of time to dry before evening. **Always rotate mildew products to avoid resistance.**

* Lower the rate or use alternate row application in very young trees to avoid damage from over application of oil.

** Use Rubigan or Flint in this application for any varieties that are mildew susceptible.

*** Zeta Zinc may be combined with spray oil and most other pesticides. Multiple applications through pink stage using light rates will overcome a damage induced zinc deficiency better than a single application at maximum rate.

PRE-PINK TO PINK (Apple scab*, Apple mildew)



Strobilurin plus protectant program:

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| • Flint | 3 oz./acre |
| or Sovran 50WG | 4 – 6 oz./acre |

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|---|-------------------------------|----------------|
| | or Lime-Sulfur Solution | 10 – 12 gal.. |
| • | Dithane/Penncozeb (scab only) | 6 lbs./acre |
| | or Vanguard (Scab only) | 3 - 5 oz./acre |
| | or Ziram 76 WDG (Scab only) | 5 lbs./acre. |

Apply the second mildew spray on susceptible varieties (Golden, Rome, Jonathan, Granny Smith, Gala, Fuji, Braeburn, and Jonagold, etc;) at pre-pink to pink. In light mildew pressure conditions, micronized sulfur before and after bloom may be sufficient, if an SI 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 has occurred as determined by the Mills wetness chart. Rally, Rubigan, and Procure are eradicant type sprays with "kickback" action, whereas, Lime-Sulfur, Dithane, and Ziram are all protectant type fungicides. Vanguard performs as a protectant at 3 oz. per acre, but performs as both eradicant and protectant at 5 oz. per acre. The safest procedure is to combine both protectant and eradicant materials for scab control during this time period.

Procure applied by air has worked satisfactorily. Under situations where ground application is not feasible, use 10 oz. per acre with a protectant.

PRE-PINK TO PINK (Pandemis leafroller) If you had any leafroller population in the orchard at all last summer it is important the overwintering generation be completely controlled. Most programs have shifted to a petal fall Intrepid, Success or Bt because the weather is frequently too cool for prebloom Bt to work well at Pink.

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|---|--------------------|-------------------|
| • | Micronized sulfur* | 10 – 12 lbs./acre |
| | Or | |
| • | Micronized sulfur* | 5 – 6 lbs./acre |
| | Plus Serenade* | 3 lbs./acre |
| • | Dipel (BT) | 1 - 1 ½ lbs./acre |
| • | Nufilm 17 | 8-oz. /100 gal. |
| • | Tech Spray MG | 4-oz./100 gal. |

See note on Zeta Zinc in the previous section.

*Add for mildew susceptible varieties unless the full program outlined above has been applied.

Dipel 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 until the petal fall spray under cool conditions. Two or more applications of these materials may be needed during the pre-bloom to 1/2-inch fruit stage if the weather is cool for good control of the first generation if leafroller or leafroller damage was easy to find the previous harvest.

Nufilm 17 with Dipel will both help with coverage and provide some sunscreen protection for the Bt. Guthion should not be used at this time for mealybug control, total season usage is 6# on apple and 6# on pears.

RUSSET REDUCTION

In addition to the materials that are recommended in the Fruit Finish Program (many of which may be combined with insect control applications) it is important to be properly calibrated to avoid uneven application of material to the tree. Current and forecast weather conditions must be taken into account. Frosty or near frosty conditions, prolonged rainy periods, slow drying of spray applications make fruit russet a high risk. Avoid spray applications during these periods.

Campyloasma

The adult Campyloasma 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 are 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.

Growers should plan on monitoring for Campyloasma themselves between calls by the fieldman. I know this is a very busy time of the year, but those critters can develop rapidly and will sneak up on you if you are not monitoring regularly. It is possible to go from none detected to an economically damaging population in the time between

regular visits by the fieldmen. If either elevation changes or frost pockets prolong the bloom in your orchard, potential Campylomma damage will be prolonged also. Keep checking!

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 without cornicles, pale greenish yellow to nearly clear, antenna pointing forward. Very 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. They are 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, the abdomen will be segmented when you look at it with 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, 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 years Campylomma nymphs are not detected until after petal fall. Controls should be considered for at least two to three weeks post bloom.

Remember that neither Carzol SP nor Lorsban can be used after petal fall.

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 near your orchard 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 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. An application of **Carzol SP** @ 1 pound per acre is sufficient, also controlling any potential Campylomma or Lygus bug threat. The spray must be completely dry before any bees begin to forage in the orchard.

Success @ 6 oz./acre provides good thrip control and may be the most economical option on apples because it will control leaf roller also. Be sure to read the label for bee safety cautions. Success will not control Lygus or Campylomma.

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 should be fumigating 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 invading 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.

Pears

The first application of **Surround** should be a true dormant application, before any green begins to show, even before bud swell if you can get into the orchard. 50 to 75 pounds of material per acre is adequate. Zinc sulfate may be combined with this first application. A late leaf drop application the previous fall may be used in locations where early spring applications are difficult.

If you are going to succeed in keeping psylla eggs off of the spurs, you have to keep the surface of the spur covered with Surround. All of the surface — all of the time! So as soon as the buds begin to swell and expose new uncoated surface to the female psylla, it's time to apply again. Those females that stayed around are now a week to 10 days closer to setting up housekeeping and they will be looking for someplace that isn't covered with dust!

The second application of Surround will be about the timing of the first part of the common two-spray sulfur and oil program. You should continue to use the Sulfur and oil program because the Surround is not killing any psylla, you've still got rust mite and scale and maybe other beasties in the orchard that you'd just as soon not have. Surround is compatible with the oil and sulfur; just always remember to put the oil in the tank last after the Surround is completely mixed.

The third application of Surround can be made with the second sulfur and oil application. This application normally includes your Chlorpyrifos, Thiodan EC, maybe some boron. **Watch out for label required set backs from water for all materials in addition to the new salmon buffer zones!**

If you've got a very light psylla population and have a lot of faith in the materials you plan to use to kill the nymph, you may elect to stop here until the prebloom spray. I don't recommend stopping here, I think any amount of psylla in the first generation is too much psylla and should be treated. You want to prevent this first generation from becoming established if you can. By working hard on the first generation there is a better chance that you could be through spraying for psylla by the first of July. I know a few organic growers in light pressure districts that regularly finish spraying for psylla early in the summer, sometimes as early as late May, but they work hard on not letting the first generation survive.

I recommend a fourth application of Surround be about a week after the second sulfur and oil, just as the leaves begin to peel away from the flower buds between stages 3 & 4, but before any white is beginning to show.

These four applications will develop and maintained a nearly complete film of Surround on all of the expanding tree surface right up to prebloom. Any psyllas left in the orchard have been extremely frustrated in their search for a place to lay eggs. When they can't hold it any longer there will be a burst of egg laying sometime after the third Surround application. This is an advantage because these eggs will also hatch during a compressed time period and make the prebloom and petal fall nymph sprays more effective.

John Dunley has found large amounts of Psylla eggs in adjoining apple and cherry blocks. The females were evidently dumping them wherever they could when they couldn't hold them any longer. Psylla can't survive except on pear, so if you can drive them out of the orchard and cause them to lay their eggs on something other than a pear tree it's as good as killing them.

I occasionally hear of 100 pound per acre applications, 75-pound applications are fairly common. Some fieldmen apparently don't feel the material works unless the tree looks as white as a flocked Christmas tree. Engelhard only recommends 50 pounds per acre per application.

I think that if you normally spray at 200 gallons pre acre or less during this time period you could possibly lower the Surround to 25 pounds per acre after the initial 50 pound application and never notice the difference in actual control. But you will absolutely need to make the three or four applications I have recommended. If you're not willing to make that many applications prebloom, don't cut the rates.

You will also have to drive slowly enough to get thorough, near perfect coverage. You can't do this at 2 ½ or 3 miles per hour, even in a dormant orchard. I recommend that you drive no more than 2 miles per hour even in a dormant orchard, slow to 1-½ miles per hour or less, as the foliage begins to develop. Change the direction of travel

from one spray to the next. Coverage is very critical. Nothing is as expensive as a poor job you have to do over or make up for with an extra spray later in the season.

Checking for Rust Mite

Rust mites are difficult to detect at tight cluster time when temperatures are cool. Before mid to late morning they are apparently sheltering within the bud or cluster. As soon as the temperature warms up they can be seen on the green tissue just above the woody part of the spur.

Between open cluster and petal fall, the rust mites seem to congregate at the base of the leaves and where the blossom stems attach to the spur. From there they mostly migrate to the calyx of the fruit, with relatively few migrating to the leaves. Once they leave the fruit stem for the fruit they become very difficult to see because of the fuzz on the fruitlets.

Rust mite activity continues to be driven by temperature as the fruit is developing. They seem to move into the calyx during cool periods and back on the fruit to feed when the temperatures warm. You might overlook a damaging rust mite population by checking too early in the morning or by only looking at the leaves.

2009 PEAR SPRAY PROGRAM

Surround through petal fall

DORMANT (Zinc)*

- Zinc Sulfate ** 20 – 40 lbs./acre
- Surround 50 lbs./acre

Do not apply this spray past the stage that the bud scales have separated. Do not apply Zinc Sulfate within 5 days of an oil application. Temperatures should be expected to reach high 40's or above on days zinc is applied. Be sure and shut off early enough in afternoon so that the last tank of spray will have plenty of time to dry before temperatures begin to drop. In late spring areas a fall application of Surround as soon as most of the leaves can be blown off the tree has proven effective for repelling Psylla in the spring. The initial Surround application, either spring or fall should be at full rate (50#/acre). Subsequent applications may be made at 25 lbs./acre.

Surround should be included with the dormant Zinc to repel egg laying in the first year of a Surround program. If Surround was used the previous year, there may be sufficient residue on the spurs to repel early egg laying on the bark, allowing the first Surround application to be delayed until new growth becomes available for egg deposit. (Stages 1 or 2)

Coverage is critical. A film or layer of Surround must continually cover the leaves and buds of the tree for as long as this method of control is depended upon to repel egg laying. Failure of Surround to reduce first generation psylla numbers are frequently traced to single or infrequent applications that are quickly outgrown providing the Psylla with attractive locations for egg laying.

The manufacturer recommends that all sprays containing Surround should be applied at 200 gallons per acre for best coverage and performance.

- *If orchard or weather conditions make this application difficult, zinc deficiency may be avoid by following an aggressive spring foliar program plus a post harvest zinc sulfate in early October. (See the Fall Foliar Nutrition Program)

**** ph must be below 7 or product could crystallize. Always buffer water first then add zinc.**



EARLY DELAYED DORMANT (stage 1 – 2) ♣

(Pear Psylla, Lygus bug, Grape mealybug, San Jose scale, Rust Mite)

- Dormant Oil * 4 – 6 gals. /acre.
- Micronized Sulfur 12 – 15 lbs./acre.
Or Lime Sulfur 10 – 12 gals. /acre.
- Lorsban (Chlorpyrifos) 4EC 2 qts. /acre
- Surround * 50 lbs./acre

♣ Growers spraying within a stream buffer zone may substitute Asana for leafroller control and Cluster Bud Esteem for San Jose Scale control in place of Thiodan and Lorsban.

* Surround may be tank mixed with both Micronized Sulfur and oil. When mixing high rates of oil with Surround and sulfur, be sure to put the Surround and sulfur in the sprayer first. After the dry materials are thoroughly wetted and the tank is nearly full, add the oil. If more adult Psylla control will be needed than Oil and Sulfur will provide, include Thiodan EC in the cluster bud timing. This is also the proper timing for the first of two Surround applications to control leafroller.

This spray may be applied from the time the bud cluster is exposed until tight cluster stage. Do not apply oil within 5 days of a Zinc Sulfate application. Use Lorsban if grape Mealybug is present. Temperatures should be expected to be in mid-40's or above on days oil is applied. Shut off early enough in the afternoon so the last tank will have plenty of time to dry before evening.

The oil in this spray will make the Surround on the tree seem to disappear. It will become visible again as the oil degrades with warm weather. The oily surface will discourage Psylla egg laying for a few days.



TIGHT CLUSTER (stage 3, also called clusterbud) ♣
(Pear Psylla, Rust Mite)

- Surround * 25 lbs./acre
- Thiodan (Endosulfan) 3EC 3 qts./acre.
Or Warrior** 5 oz./acre
- Tech-Flo Zeta Zinc 22 *** 2 qts. /acre.
- B-17 (Boric Acid Spray) 3 lbs./acre
- Centaur **** 34.5 oz./acre

♣ Growers spraying within a stream buffer zone may substitute Warrior for leafroller control and Cluster Bud Esteem for San Jose Scale control in place of Thiodan and Lorsban.

* Surround at this time also controls over wintering leaf roller. This cover should be applied as soon as Psylla eggs can be found on clean green tissue.

** Use of Thiodan EC at Delayed Dormant will reduce the egg count and improve the performance of later control measures. Thiodan and the sulfur should provide adequate rust mite control, but monitoring is essential.

NOTE: You may not use more than 3 lbs. (4 quarts EC or 6 pound WP) of active ingredient per year, therefore do **NOT** apply Thiodan at both delayed dormant and pre-bloom. **Do not apply Thiodan within 300 feet of any lake, stream or pond.**

** Apply Warrior in locations where Thiodan may not be used. Predator disruption will be minimal at this timing.

*** Include Zinc in this spray if dormant Zinc was not applied.

**** This is a good time for Centaur on eggs or wait until summer generation if Delegate will be used prebloom.



PRE-BLOOM (stage 5)
(Pear Psylla, Grape mealybug, Lygus bug, Rust mite, Pear mildew, Leaf roller)

- Surround * 25 lbs./acre
- Assail 3.4 oz./acre
Plus Summer Spray oil 1 qt./100 gals
- B-17 (Boric Acid Spray) 3 lb./ acre
- Tech-Flo Zeta Zinc 22 ** 2 qts. /acre.
- Procure 8 oz./ acre
- Rimon 32 oz./acre
- Delegate WP*** 6.5 oz./acre
- Carzol SP**** 8 - 16 oz./ acre

- MIRACALsp sp 5 – 6 ¼ lbs./acre

♣Esteem must be applied before Psylla egg lay to be an effective Psylla material.

*Include Surround at this timing if you still want to repel egg lay. This plus the prebloom applications will provide good control of leaf roller.

**Include Zinc in this spray also if dormant Zinc was not applied. Apply when bud clusters have pretty much separated but before much, if any white is showing. Surround applied now and again at petal fall will greatly suppress overwintering Leaf roller; no other control on the over wintering generation should be needed.

***Delegate is a new product for 2008 and could be used here instead of Assail.

****Carzol may not be used past petal fall without a specific written recommendation. Read SLN WA-000028 for details on maximum use rates and reporting requirements.

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 and Flameout are the only materials proven to be effective against Fireblight infection. They 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 or Flameout will not stop it. An application more than 24 hours after the shower probably won't do you much good. Do not apply Mycoshield or Flameout 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.

FIREBLIGHT CONTROL MATERIALS

Apples and Pears

Copper hydroxides, copper sulfates. (NuCop, Kocide, Champ, COCS, etc.)

8 – 16 lbs./acre per application

Limit the use of these materials to prebloom applications except on Bosc pears or other similarly russeted varieties.

Mycoshield Or Flameout

1-lb./100 gallons.

Apply at 50 to 100 gallons per acre as required by the Cougar Blight model. This is the only proven material; avoid unnecessary use to avoid developing resistance. Mycoshield is not tank compatible with Blight Ban

Blight Ban

150 grams/acre

Apply in 100 gallons of water per acre at early bloom. Repeat at full bloom. A third application may be made on rattach bloom. This material is not compatible with Copper based compounds or Mycoshield.

Blight Ban is live bacteria that compete with fire blight bacteria for living space, suppressing that population. When the Cougar Blight model indicates a high risk and moisture is probable, cover with Mycoshield.

Serenade

6 lbs./acre

Apply in 100 to 150 gallons of water per acre. Coverage is critical. Serenade is a biofungicide that is toxic to the fire blight bacteria. Apply at first white to first bloom for improved fruit finish and suppression of fire blight bacteria. Repeat during bloom when it appears fireblight risk is increasing. When the Cougar Blight model indicates a high risk and moisture is probable, cover with Mycoshield.

Serenade is toxic to bacteria and may be substituted for a Blightban program but has the advantage of not requiring colonization before bacterial growth begins.

Serenade will be a valuable resistance management material to prolong the effect of Mycoshield.

2009 APRICOT SPRAY PROGRAM

DORMANT SPRAY (Coryneum blight)



- Nu-Cop 50DF 8 lbs./acre
+ NuFilm 17 1 pt./acre
or
- Nu-Cop 3L 1 – 1 ½ gals./acre

Apply before bud swell. (Moderately effective on Coryneum, usually applied too late.)

PRE-BLOOM (First White)(Lygus bugs, Cutworms, Grape mealybug)



- Dormant Oil * 1 gal. /100 gal.
Or Esteem 5 oz./acre
- Thiodan 50WP *** 4 lbs./acre
or Diazinon 50W 4 lbs./acre
- B-17 (dry Boric Acid) 4 lbs./acre

Use Diazinon if grape mealybug is present.

* Oil should be applied if Lecanium Scale is present. Esteem is an excellent scale material if scale has been a problem.

*** You may not use more than 3 lbs. (4 quarts EC or 6 pound WP) of active ingredient per year, therefore do **NOT** apply Thiodan at both pre-bloom and post bloom. **Do not apply Thiodan within 300 feet of any lake, stream or pond.**

PETAL FALL to first SHUCK FALL (Lygus bugs, Grape mealybug, Twig borer)



- Success 8 oz./acre
or Diazinon 50W* 4 lbs./acre
- Mira Cal 5 lbs./acre

* If mealy bug control is needed.

Apply at stage 7, before the green fruit stage. Later application will result in poor Twig Borer control.

2009 CHERRY SPRAY PROGRAM

DORMANT SPRAY (Stage 2) (Coryneum blight)

- Nu-Cop 50DF* 10 – 12 lbs./acre
Or Nu-Cop 3L 1 gal. /acre
- + Nufilm 17 1 pt. /acre
- Zinc Sulfate ** 20 - 40 lbs./acre

Apply after buds have begun to swell but before green tip. Temperatures should be expected to reach high 40's or above on days zinc is applied. Be sure and shut off early enough in afternoon so that the last tank of spray will have plenty of time to dry before temperatures begin to drop.

*This copper spray may be added as a preventive measure to any pre-bloom spray in a 'clean' orchard. Northern districts or individual orchards that are experiencing problems with Pseudomonas should make multiple applications. Apply the first as early in the spring as it is possible, another light rate prebloom to reduce the risk of frost damaged tissue becoming infected, then again in the early in the fall before or during leaf drop.

** **ph must be below 7 or product could crystallize. Always buffer water first then add zinc.**

DELAYED-DORMANT (Stage 3 – 4) (San Jose scale, European red mite, Two Spotted Mite* Black cherry aphid)



- Dormant Oil ** 3 – 4 gal./acre
- Apollo* 6 – 8 oz./acre
- Lorsban 4E 2 qts. /acre
- Tech-Flo Zeta Zn 22 2 qts. /acre
- B-17 (Boric Acid Spray) 3 lbs./acre
- Nu-Cop 50DF*** 10 – 12 lbs./acre

Apply from green tip stage to tight cluster. This spray should be on before any cluster separation is evident. Temperatures should be expected to be in mid-40's or above on days oil is applied. Shut off early enough in afternoon so that last tank will have plenty of time to dry before evening. Do not apply oil within five days of zinc sulfate. Pre-bloom spray may be a better option than a delayed dormant spray on cherries unless pandemis control is needed.

* If large numbers of Two Spotted Adults have overwintered and are beginning to move up the tree, use Diazinon & Oil now. Monitor the population closely at petal fall for possible control with Vendex for additional control of adults, or a Vendex/Apollo combination if there has been appreciable eggs deposited before the application is made.

** If spider mites or scale were not problems last season, oil is not recommended because of the uneven delay of bloom. Black Cherry Aphid will be controlled with Provado as needed.

*** If copper was not applied during the dormant time period.

PRE-BLOOM ▼ (Cutworms, Black cherry aphid, Grape mealybug)



- Diazinon 50W * 4 lbs./acre
- Tech-Flo Moly Mag 2 qts. /acre
- Tech-Flo Cal-Bor+Moly 2 qts./acre
- Miracal sp 5 lbs./acre
- B-17 (Boric Acid Spray) 3 – 5 lbs./acre
- Tech-Flo Zeta Zinc 22 2 qts. /acre
- Calcium Nitrate (Spray grade) 10 lbs./acre

- Nu-Cop 50DF** 10 – 12 lbs./acre

*Apply this spray before first white with no bees in the block. Use Diazinon if grape mealybug is a target. Diazinon used at this timing will not leave a harvest residue and will save the single allowable use per season of Thiodan for shuck fall on Green Soldier Bug.

** If copper was not applied during the dormant time period.

▼Cherry fruit size equals money. Cherries will respond favorably to an aggressive foliar nutrient program that begins prebloom and extends through pit hardening, about two weeks after shuck fall. See the nutrient section for possible additional timing and materials.

BLOSSOM SPRAY (Brown rot) *

- Rovral 50W 2 lbs./acre
- or
- Elite 45 DF 8 oz./acre
- or
- Orbit 4 oz./acre
- or
- Rally 40W 5 oz./acre

* Nutrients may be combined at this timing and at Petal fall.

If brown rot is an annual problem, make the first application at white bud, a second application at 50% bloom, followed by a petal fall spray if the bloom is prolonged or weather conditions are conducive to fungal infections. Where fruit rot has been a problem, preharvest applications are also necessary. Do not apply Rovral more than 5 times per season. Do not apply more than 3 ¼ pounds of Rally 40W per acre per season.

2009 PEACH SPRAY PROGRAM

DELAYED-DORMANT SPRAY (Green peach aphid, San Jose scale, Lecanium scale, Peach twig borer)



- Nu-Cop 50DF 10 lbs./acre
- + Nufilm 17 1 pt. /acre
- or
- Nu-Cop 3L 1 – 1 ½ gal. /acre
- Dormant Oil 1 gal. /100 gal.
- Asana XL 12 oz./acre
- Esteem (San Jose Scale) 5 oz./acre

Apply at green calyx (stage 2). It is important to have this spray on before red calyx (stage 3) for the very best green peach aphid control i.e. before aphid begins to hatch. This application is moderately effective on Coryneum in the Spring, it is usually applied too late to prevent twig infection.

PRE-BLOOM THROUGH BLOOM (Lygus bugs, Western flower thrip)



- Carzol SP * 1 lb./acre
- Or Success** 8 oz./acre

This application is very important to prevent marking on Nectarines. If blossoms are open apply at night or while bees are not working in blooms. Western flower thrip are not as much of a threat to peaches as they are to nectarines.

Maximum Carzol allowed per season is 1 ¼ lb. per acre. Do not apply after shuck fall.

Success has controlled Western flower thrip in apples; we don't have any information available for peach & nectarine. Application of Success during bloom would serve in place of a petal fall twig borer spray. Success will not control Lygus bugs.



PETAL FALL SPRAY (Green Peach Aphid, Peach twig borer, Fruit tree leafroller, Mildew*, Coryneum blight**)

- Captan 50WP **
- Success 2 oz./100 gal.
Or Thiodan 50WP *** 4 lbs./acre
- Rally 40W 5 oz./acre.
Or Gem 8 oz./acre
Or Orbit 4 oz./acre.
Or Summer spray Oil (70 grade)* 1 gal. /100 gal.
Or micronized Sulfur 12 lbs./acre
- B-17 (Boric Acid Spray) 3 – 5 lbs./acre
5 lbs./acre

Apply this spray at Stage 7, petal fall or post bloom depending on the variety. Later application will result in poor Peach twig borer control.

* Mildew protection at petal fall and shuck fall is critical to avoid mildew on the fruit. Oil may be combined with Rally, Orbit or Flint for additional control. Do not apply sulfur or oil with 14 days of each other, do not combine oil and Captan!

**Begin Coryneum Blight control at petal fall if the weather has been wet during bloom, otherwise you may wait until the shuck has fallen unless disease pressure is know to be high.

*** **NOTE:** You may not use more than 3 lbs. (4 quarts EC or 6 pound WP) of active ingredient per year. Do not apply Thiodan within 300 feet of any lake, stream or pond.

FOLIAR NUTRIENT PROGRAM FOR FREEZE PROTECTION

(Copied from NUTRIENT TECHNOLOGIES Tech Bulletin #3)

The use of foliar nutrients as frost protectants was being promoted even before publication of the research by Dr. Steven Lindow at the University of California, Berkeley, which showed that certain naturally occurring bacteria such as *Pseudomonas syringae* and *Erwinia herbicola* act as nucleating agents for ice formation. The presence of these ice-nucleation-active bacteria results in the formation of ice crystals in plant tissue at temperatures several degrees higher than in their absence. When water in plant cells freezes, it expands and ruptures the cell walls, leading to cell necrosis. The bacteria can be killed or prevented from acting as nucleating agents, thus providing several degrees of frost protection. This discovery provided a plausible explanation for the previously observed positive effects of foliar nutrients on freeze tolerance. While the mechanism can be explained, there is no general agreement on which chemicals are most effective in controlling the ice-nucleating bacteria. Several specially formulated products are commercially available, but in controlled tests these have generally not given better results than copper-based fungicides or micronutrient mixtures. Certain urea-based products, antibiotics, anti-transpirants, and surfactants have also been claimed to be effective.

Just as low temperatures are not the only factor involved in freeze damage, it is likely that control of ice-nucleating bacteria is not the only factor involved in improving freeze resistance. Gradually lowering temperatures promote cold hardiness. Trees under long-term water stress are less cold hardy. Plant growth regulators play an active role in influencing freeze resistance. High gibberellin levels have been reported to increase susceptibility to environmental stress. During chilling, a precursor of auxin has been shown to accumulate in buds, followed by the gradual appearance of auxin

Plant nutrients are capable of influencing these factors. Copper, because of its inherent fungicidal properties, is considered the most effective element for control of ice-nucleating bacteria. Zinc also has mildly fungicidal properties and has been shown to be a co-enzyme for the biosynthesis of tryptophane, a precursor of auxin. Potassium, Calcium, and Phosphate play important roles in freeze protection and recovery as described in Technical Bulletin No. 4. (available upon request)

The following programs are recommended for frost protection. These programs supply Copper, Zinc, Manganese, Phosphate, Potash, and Calcium.

FOR FREEZE RESISTANCE ON TREE CROPS (apply in early spring at the time a freeze is anticipated or predicted)

TECH-FLO ZMC: 2 quarts per acre.

TECH-SPRAY Hi-K: 2 quarts per acre.