WASHINGTON STATE UNIVERSITY EXTENSION
World Class. Face to Face.

CRANBERRY VINE

WSU Long Beach Research and Extension Unit
2907 Pioneer Road • Long Beach, WA 98631 • 360-642-2031 • pattenk@wsu.edu

June 2012

MEETINGS

Washington Cranberry Summer Field Day: Field Day will be at the PCCRF farm on Friday, July 27th from 9:00 a.m. to 2:00 p.m. Registration starts at 8:30 a.m. Pesticide credits will be given.

Oregon Cranberry Field Day: The 2012 Oregon field day will be on Thursday, June 28th. For more information about the event, contact Linda White at (541) 572- 5263 X285.

Miscellaneous: The NRCS cutoff date for EQIP projects in 2013 is July 1, 2012.

2012 PESTICIDE UPDATES

Curio herbicide: Washington will maintain its SLN label for 2012, and Oregon just obtained one. The cranberry SLN label is not available without signing the waiver. Growers have reported fair to great weed control results with mild to no damage to cranberries. It all depends on the weed species, the rate, timing, surfactants, spray volume, and tank mix combination. Avoid hook and bloom applications at the 1 oz rate to minimize the potential for crop loss.

Quinstar herbicide: Washington and Oregon received a Section 18 for 2012 for yellow weed control. Growers have reported excellent yellow weed control from 2011 trials, with several reporting good control of young willows and other small newly emerging dicots. For yellow weed control, the best treatment timing is when the yellow weed just emerges above the vines and then again in ~30 days. Our data suggest very good crop safety with Quinstar.

Directions for use and additional information on Section 18's are provided at the end of the newsletter. Quinstar has MRL problems and is not for export fruit.

Altacor: There is a Section 3 label for this new reduced risk insecticide. We have gotten great efficacy on fireworm with it using chemigation. It also has the advantages of having a long residual, being systemic and is an ovicide. It stops fireworm feeding immediately. It is the safest chemistry on the market for use when bees are present. It also has activity on tipworm. For export market do not use past July 15th.

Indar & Abound: We have been obtaining consistent results with significant increases in yield (5 to 20%) and decreases in fruit rot with two mid-bloom applications (7 to 10 days apart) with a combination of Abound (12 to 15.4 oz/ac + Indar 2F (9 to 12 oz/ac). These results have also been reported in all the other grower areas. I recommend growers conduct trials of their own on good producing beds.

PEST MANAGEMENT

Cranberry Pest Management Guide EB0845: This annually updated guide is now only available on-line and can be downloaded for free as a PDF file. The 16-page 2012 version can be found at

http://cru.cahe.wsu.edu/CEPublications/eb0845e/eb0845e.pdf

2012 PNW Insect, Weed and Disease Control Handbooks: If you've never looked at these PNW pest control handbooks, they contain a great deal of detailed information on each specific pest affecting cranberries, and all other crop and non-crop situations. They can be downloaded as PDF files. See http://www.ipmnet.org/IPM_Handbooks.htm.

Disease control – new plantings: We have noticed that that some of the new varieties appear to be sensitive to foliar diseases when they are being pushed hard for vegetative growth. Look closely for premature leaf drop and other symptoms such as red leaf spot. Treat proactively with one of the many available fungicides.

Weed Control: With four really good post-emergent weed control tools (Callisto, Curio, Quinstar, and Select), we now have reasonable control options for most west coast cranberry weeds. Hurrah -- It is has been a long time coming. We will shortly be developing specific recommendations for all major and minor weeds. False Lily-of-the-Valley remains the most recalcitrant and as of today we haven't found anything that shows selective efficacy.

Fireworm: Our 2012 whole farm/ whole bed trials comparing efficacy of the reduced risk insecticides for first generation fireworm are turning out to be very interesting. Altacor and Intrepid are both getting stellar performance reviews. Altacor stopped fireworm feeding immediately; we are finding no live worms in any of the treated beds. Intrepid takes longer for control, but similarly we have had no live worms a week post-treatment. Intrepid and Altacor both have longer persistence than conventional insecticides. Delegate has had mixed efficacy, with lots of dead fireworm, but also numerous live ones that escaped control. Based on comparable efficacy and the lack of risk for water quality and non-target beneficial insects, (pollinators, spider, and parasitoid) we encourage growers to fully embrace these alternative insecticides.

Spotted Wing Drosophila (SWD): The concerns other soft fruit industries are having with this pest are not our worries. After several years of monitoring and research trials, here is our conclusion – we have lots of SWD, especially in the late fall, but even with lab and field incubation trials we have not gotten SWD to successful lay their eggs and hatch in whole intact cranberries.

CRANBERRY MANAGEMENT

Soil Fertility and Plant Nutrition: If you haven't taken samples soil or leaf analyses for several years consider doing this. It is really hard to guess correctly on your nutritional needs without some basis on the general status of your beds.

Frost protection: We are at the end of frost season for 2012 and as I drive around I am noticing that there are numerous beds with the tell-tale signs of frost damage. For a short time period, the new vegetative tip is actually more sensitive to frost than flowers. Damaged tips result in an umbrella bloom where there are flowers but no upright growth. These flowers may provide a partial crop, but don't hold out high expectations for a good yield. Due to the contrast in foliage color between damaged and undamaged beds, it is now very easy to note patterns of frost damage within and across beds. Thus now is a great time to find frost pockets on your farm and use those locations to place your frost sensors next spring.

Also important – note if there are patterns assorted with a lack of uniformity with your irrigation systems. Finally, figure out what went wrong and make sure it doesn't happen again. Most damage, other than system failure, is associated with too long an off-cycle, or not having your sensors uncovered (exposed to open sky), at tip level, in a fully vegetated bed, and located in a cold pocket on your farm.

Irrigation uniformity: We are making our way across Washington cranberry farms testing for system uniformity and chemigation calibration. If you haven't signed up and are interested in us conducting uniformity trials on your beds, let me know. On farms with poor design we are also trying to see if retrofitting with other sprinkler heads will improve performance.

Irrigation Scheduling Made Easy (by Troy Peters)

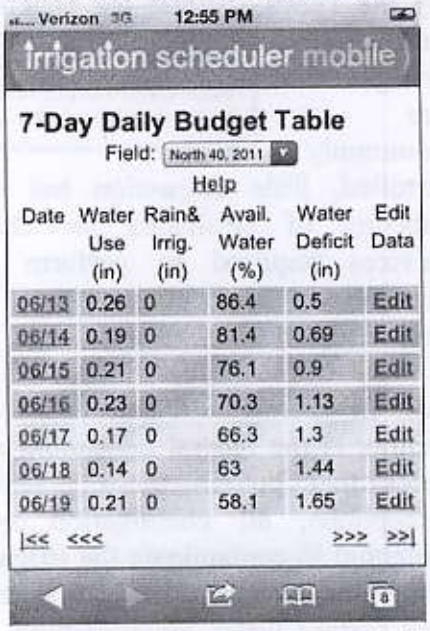
When do I turn the water on? How long do I leave it on? Although these are straightforward questions, finding good answers to these questions can be quite complex. Most growers realize, however, that getting it right has big payoffs. Good irrigation water management will increase yields, improve crop quality, decrease fertilizer requirements, save pumping energy costs, conserve water, and reduce non-point source pollution. In short, you as a grower are going to be more profitable, and environmental groups are going to be happy.

Troy Peters, the WSU extension irrigation specialist, partnered with AgWeatherNet director Gerrit Hoogenboom, and AgWeatherNet web developer Sean Hill to develop Irrigation Scheduler Mobile. Irrigation Scheduler Mobile is a free online irrigation scheduling tool for doing simplified check-book style irrigation scheduling. It is optimized for use on a smart phone and works on any platform including iPhone, Android, MS Windows Phone, or Blackberry. Because it operates as a web page, it also works perfectly well on any desktop web browser. It is fully integrated with Washington's AgWeatherNet so that daily crop water use (ET) estimates and rainfall data are automatically filled in.

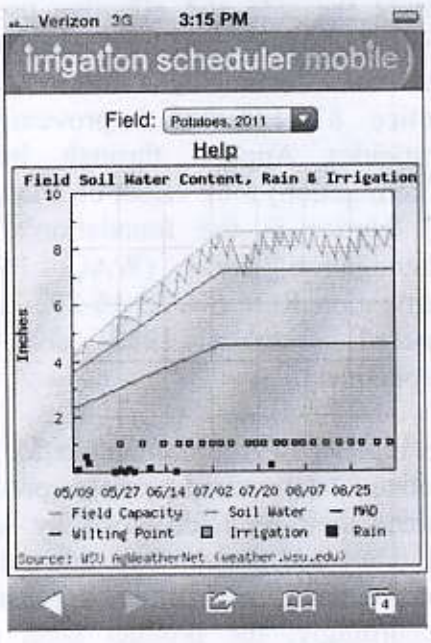
To maintain privacy and to keep track of each user's data independently each user logs in using a free AgWeatherNet username and password. Although it is fairly simple to set up, it is flexible for fine tuning by educated users. The user just enters the irrigation amounts on the day that they happened. The model can be corrected or updated on any date with soil moisture estimates or measurements. The model outputs a daily budget table, and several useful graphs including: the daily soil water content, the daily crop water use, the cumulative water use, the crop coefficients and root zone depth over time, the estimated amount of water lost to deep percolation, and the degree of water stress and estimated yield loss to the crop due to water stress.

Get started today using it at http://weather.wsu.edu/is/. A full help manual is also available online at http://weather.wsu.edu/is/ISMManual.pdf. For additional help, or if you would like to submit any questions or comments please contact Troy Peters at troy_peters@wsu.edu, or at 509-786-9247.

Daily Budget Table Screen: As the soil water content gets near the point where the plant will see water stress, the lines change from green (good) to yellow (warning), and then to red when the model estimates that the plant is water stressed. The Edit button is used to add irrigation amounts or a soil moisture measurement to correct the model on that date. Selecting the date gives more model information.



Soil Water Chart: The estimated soil water content is plotted in relation to the field capacity, the management allowable deficit (point where the tree or vine will begin to see water stress, and the wilting point (point where the tree or vine dies). Also plotted are irrigation and rainfall events. All of these increase with a growing root zone.



Alternative Technology and the Intent of Label Provisions (by Tom Hoffman, WSDA, and Leigh Nelson, NRCS)

The injection of pesticides (chemigation) or fertilizers and soil amendments (fertigation) into irrigation water for application to plants or land has been practiced since the 1970s and widely adopted by the 1980s. While the benefits of chemigation and fertigation are commonly extolled, little discussion has ensued about the labeling of pesticides for chemigation, safety devices required to perform chemigation and fertigation applications, or the applicator's responsibility.

> Antipollution devices have been a requirement on chemigation and fertigation systems since 1988 – nearly 25 years ago.

Just as chemigation and fertigation are not new, neither is the federal legislation nor state laws and rules that govern these practices. With few exceptions, all chemigation systems have the potential to contaminate the irrigation water supply. Prompted by concerns with potential groundwater and surface water contamination, in 1980 Congress authorized the U.S. Environmental Protection Agency (USEPA) to write guidelines that would ensure the safe and effective use of pesticides if applied through irrigation systems. That USEPA guidance document, Pesticide Regulation (PR) Notice 87-1: Label Improvement Program for Pesticides Applied through Irrigation Systems (Chemigation) took effect on March 11, 1987. The PR Notice is the foundation for Washington's Chemigation Rule (WAC 16-202-1001) and Fertigation Rule (WAC 16-202-2001), which were enacted October 1989 and January 1991, respectively.

To receive EPA-authorization for chemigation, PR Notice 87-1 required pesticide product registrants to amend their pesticide labels by April 30, 1988, to include additional use directions, equipment requirements, and other application restrictions. Accordingly, the product label (Figure 1) must include use directions that reference specific safety devices intended to protect source water from possible contamination, principally from the two forms of backflow: backpressure and

Figure 1. Chemigation use provision to Admire Pro

backsiphonage. The principle backflow prevention devices – irrigation mainline check valve, inspection port, vacuum relief valve, and low pressure drain – are typically engineered into a single device, known by industry as an irrigation mainline chemigation valve (Figure 2).

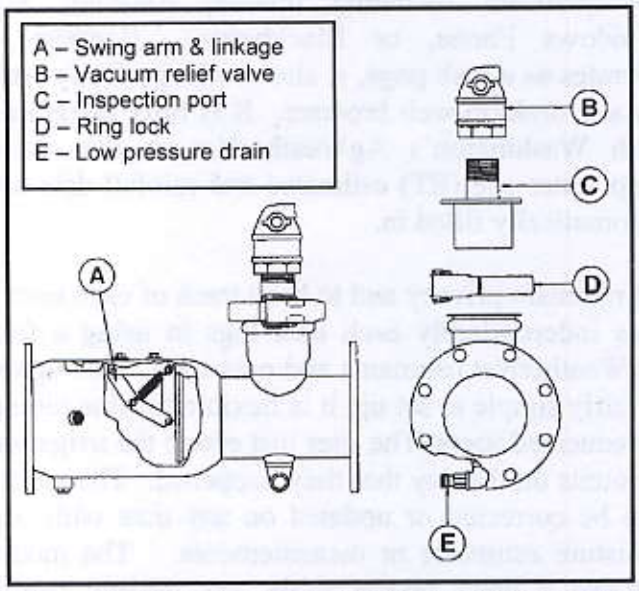


Figure 2. Irrigation mainline chemigation valve.

However, there is more to the story. What is not referenced on pesticide labels is the "List of USEPA Authorized Alternative Chemigation Safety Equipment." Included on this list is EPA-authorized alternative technology that has direct implications to the cranberry industry. Of the alternative devices, the barometric loop is unquestionably the most significant. The barometric loop may be substituted

substituted for various backflow devices required on the irrigation mainline. The barometric loop is most common with solid set and drip irrigation systems.

Commonly known as a gooseneck pipe loop, a barometric loop is based upon the principle that a water column, at sea level pressure, will not rise above 33.9 feet. (A column of air extending from the earth's surface upward for about 7½ miles – referred to as the troposphere layer – weighs approximately 14.7 pounds at sea level. The 33.9-foot lift assumes that pressure on the surface of the water inside the pipe is zero, and the pressure at the level of the water on the outside of the pipe is at atmospheric pressure. The rise of water in the pipe is due to the pressure differential.) In this regard, a barometric loop can effectively protect against backsiphonage; however, it may not be used to protect against backpressure.

The barometric loop may be substituted for an irrigation mainline chemigation valve, or its comparable components. However, the device must be appropriately configured (Figure 3). The Washington State Chemigation and Fertigation Rules require the follow configuration.

- The barometric pipe loop cannot be used on a system pumping from a ground water source.
- The barometric pipe loop must be located in the main water line immediately downstream of the irrigation water pump.
- The bottom of the barometric loop apex must be at least 30 inches above the highest water-emitting device or of any portion of the irrigation system.
- A vacuum relief device must be located at the top of the loop apex and must allow unrestricted air flow into the pipeline immediately upon loss of water pressure. The orifice size must comply with current American Society of Agricultural and Biological Engineers (ASABE) standards. (For example, a pipe diameter of six inches or less must be fitted with an air-vacuum release valve having a minimum outlet diameter of two inches.)
- The chemical injection port must be located downstream of and at least 30 inches below the bottom of the pipe loop apex.

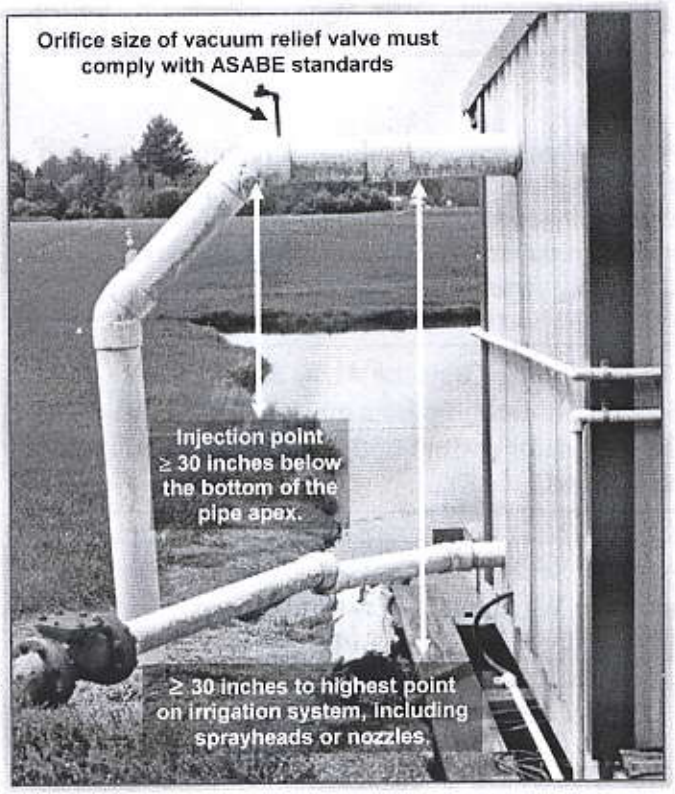


Figure. 3. Barometric loop design for backflow prevention.

A barometric loop prevents backflow from the standpoint of backsiphonage, or a vacuum condition. Barometric loops cannot protect against backpressure.


Figure 4. Irrigation foot

Despite a common misconception, a foot valve is NOT a suitable backflow prevention device (Figure 4). As the primary mechanism for source water from contamination, the backflow prevention device must allow for visual and manual inspection to determine operational integrity.

If you have questions about chemigation device requirements or wish to receive additional information, contact Tom Hoffmann, WSDA Chemigation and Fertigation Technical Assistance Program, at (509) 766-2574 or by email: Thoffmann@agr.wa.gov. He is also available to perform a technical assistance inspection, conferring with you in evaluating your system's compliance with federal laws and state rules.

FIFRA Section 18 and Emergency Conditions – A Rationalization for QuinStar 4L (by Tom Hoffman, WSDA)

While some may consult tarot cards, crystal balls, or other paranormal vestiges to predict pest problems, the prudent would choose a more efficacious approach in responding to unanticipated emergency conditions concerning a pest. Specifically, the process involves pursuing a Section 18 emergency exemption for a pesticide.

Section 18 of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act, the federal law that regulates pesticides) authorizes the Environmental Protection Agency (EPA) to exempt federal and state agencies from federal pesticide registration requirements if it is determined that "emergency" conditions exist which require an exemption. An **Emergency Exemption from Registration** is used when an emergency pest situation arises for which no acceptable pesticide is registered or available in the state.

An emergency condition is an urgent, non-routine situation that requires the use of a pesticide where (1) no effective pesticides are registered for use, (2) no feasible alternative control practices exist that provide adequate control or are economically viable, and (3) the situation involves a new pest and will cause significant economic loss to the affected crop or will pose significant risk to human health, to endangered or threatened species, to beneficial organisms, or to the environment.

If an emergency pest condition is determined to exist, Section 18 of FIFRA authorizes EPA to allow the use of a pesticide to a site on which it is not federally registered for a limited period of time specified on the Section 18 approval document, but not to exceed one year. This is the basis for the Section 18 that was recently granted for the use of QuinStar 4L to control Yellow Loosestrife (*Lysimachia terrestris*) on cranberry. The expiration date for use of QuinStar 4L on cranberry is August 1, 2012.

Section 18 applications must originate with someone other than the product registrant; these "third-parties" typically represent Extension personnel, grower groups, commodity associations, research foundations, or others. The third-party petitions the state lead agency – WSDA, in this case – to request an emergency exemption from EPA derived from information provided by the applicant. EPA evaluates the request and decides whether or not to authorize the use. For a first-time request, the emergency exemption process requires approximately 120 days to complete. Most of that time is dedicated to EPA review of the application. Although subsequent requests may be filed, EPA authorization is not routine; the process becomes increasingly rigorous with successive applications. If the pest problem is ongoing, the petitioner must demonstrate progress toward a registered use on the full federal label (Section 3).

WSDA requires the registrant (or manufacturer) of the pesticide to make available at the point of sale use directions (sometimes referred to as a Section 18 "label") that describes the use which was authorized under the Section 18. The section 18 use directions must be approved by WSDA prior to using the product.

Special restrictions generally accompany the use of these products, which may include additional record keeping, specific safety precautions, or licensing restrictions. For QuinStar 4L, the maximum treated area cannot exceed 600 acres.

FIFRA Section 18 Emergency Exemption Use Directions
EPA File Symbol No. 12WA04

STATE: Washington (Pacific, Grays Harbor, Whatcom, & Pierce Counties)
CHEMICAL: Quinclorac (QuinStar 4L)
CROP / SITE: Cranberry (bearing and non-bearing) - A maximum of 600 acres
PEST: Yellow loosestrife (Lysimachia terrestris)
EFFECTIVE: 04/27/2012 through 08/01/2012

EPA regulations require that a final report be submitted that summarizes the results of the pesticide use. Although the report is submitted to EPA by WSDA, compiling required information is the responsibility of the person, organization, or commodity group that submitted the Section 18 application to WSDA.

To legally use QuinStar 4L®, an approved Section 18 use directions must be in possession of the applicator at time of the application and must be followed.

A list of Section 18: Emergency Exemption labels active in Washington State can be accessed at http://cru66.cahe.wsu.edu/LabelTolerance.html

FIFRA Section 18 Emergency Exemption Use Directions

EPA File Symbol No. 12WA04

State: Washington (Pacific, Grays Harbor, Whatcom, and Pierce Counties)

Chemical: Quinclorac (QuinStar 4L)

Crop/site: Cranberry (bearing and non-bearing) - A maximum of 600 acres.

Pest: Yellow loosestrife (Lysimachia terrestris)

Effective: 4/27/2012 through 8/1/2012

Rate of application: A maximum of 8 fluid ounces of product (0.25 lb. a.i.) per acre per application, not to exceed 16 fluid ounces of product (0.5 lb. a.i.) per acre per season. A maximum of two applications are allowed, with a minimum of a 30-day interval between applications. Apply in 10-40 gallons of water per acre. Use either a crop oil concentrate at the rate of 1 quart per acre, or a nonionic surfactant at the rate of 1 quart per 100 gallons (0.25% vol./vol.).

Method of application: Apply using ground spray equipment as a post-emergence application (broadcast or spot-treatment). Ensure that spray equipment is properly calibrated.

RESTRICTIONS / PRECAUTIONS

- Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours.
- Do not apply QuinStar 4L within 60 days of harvest.
- Do not apply by air or through any type of irrigation system.
- Use only nozzles that will produce uniform spray patterns and thorough spray coverage, spaced up to 20 inches apart. Select nozzles designed to produce minimal amounts of fine spray particles. Use of drift reduction nozzles is recommended.
- Do not make spray applications when wind speed is greater than 10 mph, when air temperatures exceed 90°F, or when environmental conditions exist for temperature inversions.
- Drift Control Products: Drift Control Products should always be added to the spray solution to affect spray droplet size and other characteristics, reducing the potential of off-target accidental spray drift.
- This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Keep out of lakes, ponds, and streams. Do not apply directly to water, areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water by cleaning of equipment or disposal of rinsate.
- Sensitive Areas: QuinStar 4L may only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).
- Any adverse effects resulting from the use of QuinStar 4L under this emergency exemption must be immediately reported to the Washington State Department of Agriculture (877-301-4555).
- These use directions must be in possession of the user at the time of application.
- Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the registered product label for QUINSTAR 4L (EPA Reg. No. 42750-169)

A Chemigation Aphorism

Overtime, some pithy sayings have come to represent a general truth, or an accepted rule. Held as universal principles, these idioms may become so widely held and recognized that expressing them are thought meaningless. Some of these truisms include: "Let sleeping dogs lie," "Don't run with scissors," "A fast moving freight train always has the right-of-way at railroad crossings," and, a personal favorite, "Do not inject on the suction side of an irrigation pump."

With the addition of chemigation sections to the labels of pesticides authorized by USEPA for chemigation (refer to the accompanying article "Alternative Technology and the Intent of Label Provisions"), a once common use provision prohibited the injection of a pesticide upstream (suction side) of the irrigation mainline pump. A few pesticide labels still retain this provision (Figure 5).


SipcamAdvan

Echo® 90 DF

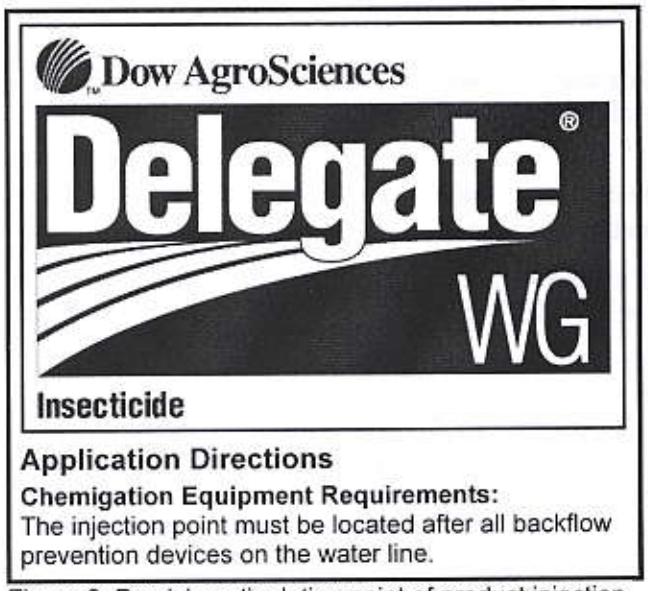
AGRICULTURAL FUNGICIDE

APPLICATION THROUGH SPRINKLER IRRIGATION SYSTEMS (CHEMIGATION)

Always inject ECHO into irrigation water after it discharges from the irrigation pump and after it passes through the check valve. Never inject pesticides into the intake line on the suction side of the pump.

Figure 5. Provision prohibiting injection on suction side of pump.

Eventually, this provision progressed into a more succinct use restriction that appears not only in the chemigation section of pesticide labels but also in the Washington State Chemigation and Fertigation Rules. It specifically requires that the injection port where the product enters the irrigation pipeline must be downstream of the irrigation mainline check valve (Figure 6). Should a barometric loop serve as an alternative backflow prevention device (refer to the previously referenced article), the injection point must be located downstream of and at least 30 inches below the bottom of the barometric pipe loop apex.


Dow AgroSciences

Delegate® WG

Insecticide

Application Directions

Chemigation Equipment Requirements:

The injection point must be located after all backflow prevention devices on the water line.

Figure 6. Provision stipulating point of product injection.

While injecting a product upstream of the irrigation mainline pump may be convenient and expedient, the practice is in violation of federal legislation and state laws and rules.

This practice may originate from a misunderstanding that an irrigation foot valve is an acceptable backflow prevention device. Injection of a pesticide or fertilizer into irrigation water can only occur downstream from a legal backflow prevention device.

It's Only a Measure of Time

Irrigation systems are probably influencing cranberry yield and quality significantly more than most growers may have imagined. If frost protection and supplemental water typify the primary functions of an irrigation system, most could, to a point, forego high distribution uniformity. However, with an effective rooting zone of only three inches, cranberry plants are highly predisposed to water stress arising from irregular moisture levels throughout a bed. If used for chemigation and fertigation, an irrigation system's distribution uniformity is critical to ensure product effectiveness and to reduce the potential for environmental contamination.

Distribution uniformity is a measure of the uniformity of irrigation water over an area.

However, with chemigation and fertigation applications, uniform distribution uniformity is only one aspect of the story.

Effective pesticide performance with chemigation or efficient use of plant nutrients from fertigation is directly influenced by an irrigation system's travel time, rinse time, and wash-off time. (Refer to the sidebar for definitions of these time-interval terms.) Time-interval assessments of an irrigation system will determine whether a pesticide will have its intended effect on a pest or whether a fertilizer will benefit plant growth and development, or if these products will contribute to surface or ground water degradation.

Injection Time: *The amount of time needed to inject the material into the irrigation system.*

Travel Time: *Time required for the material to travel from the injection point to the first sprayhead in the bed. This is primarily affected by pipe length, diameter of the mainline, and operation pressure.*

Rinse Time: *Time interval from the end of the injection process until the chemical clears the last sprayhead on the irrigation system. This is the length of time an irrigation system must be operated after the injection is completed.*

Wash-off Time: *The time necessary to flush product from the irrigation system, the first to last sprayhead in the treated area. The difference between rinse time and travel time is often referred to as travel time on bed.*

Time-interval measures are highly influenced by irrigation system layout, size of the bed, and pumping plant capacity. Of these measures, injection time affects the dilution of the product being injected. It is determined by pipeline length, diameter of the mainline, and application rate. Consequently, injection time is not a fixed value, but a function of the time-interval characteristics of an irrigation system (e.g., travel time, rinse time, and wash-off time). In many cases, injection time is established by the pesticide label. Reported as a duration of time, acre-inch applied (Figure 7), or gallons of water per acre (Figure 8), injection time may dictate where the point of injection will be located on the irrigation system.

Figure 7. Injection time based on acre-inch applied.

Dow AgroSciences

Intrepid®

2F

Insecticide

Application Directions

General Directions for Chemigation: Do not exceed 900 gallons of water per acre application volume using Just enough water to thoroughly wet the plants but not the soil. Use minimum volume for flushout to avoid diluting or rinsing off product. Washout time should not exceed six (6) minutes.

Figure 8. Label requirement for injection and wash-out times.

being injected. It is determined by pipeline length, diameter of the mainline, and application rate. Consequently, injection time is not a fixed value, but a function of the time-interval characteristics of an irrigation system (e.g., travel time, rinse time, and wash-off time). In many cases, injection time is established by the pesticide label. Reported as a duration of time, acre-inch applied (Figure 7), or gallons of water per acre (Figure 8), injection time may dictate where the point of injection will be located on the irrigation system.

> Pesticide effectiveness is governed by placing the material in contact with the pest at a sufficient concentration for a sufficient period of time.

Rinse and wash-off times significantly influence the dilution rate and the spatial placement of the product to the target area (leaves, fruit, or roots). Rinse and wash-off times can jeopardize product effectiveness by diluting a product below a concentration necessary to control a pest, by reducing pest exposure time (due to washing off of the product), or by placing a product (spatial placement) where it will have little or any affect. Therefore, to ensure product effectiveness and to minimize both leaching and surface runoff, rinse time and, especially, wash-off time should be minimal (Figure 8). This is especially true in managing pests requiring pesticide retention on foliar parts of the plant, such as fungicides and most insecticides, or with products that have minimal or no systematic properties (i.e., root or foliar absorption and translocation throughout the plant). In this regard, spatial placement on foliage is critical to ensure product efficacy. The effectiveness of many pesticides, especially the newer chemistries, may be directly affected by the amount of time required for wash-off time. Pesticide labels may require that the irrigation and injection systems be "thoroughly flushed clean" before system shutdown (Figure 7). (System flushing is also a requirement with fertigation.) In essence, rinse and wash-off times are being referred to as label requirement.

A dye test – the injection of a concentrated dye solution into an irrigation system – should be performed to determine how long to operate a chemigation or fertigation application and to observe the distribution pattern of the irrigation system. This practice is called "timing the system." Ideally, a dye test should be performed every year, certainly anytime after significant modifications are made to the irrigation system.

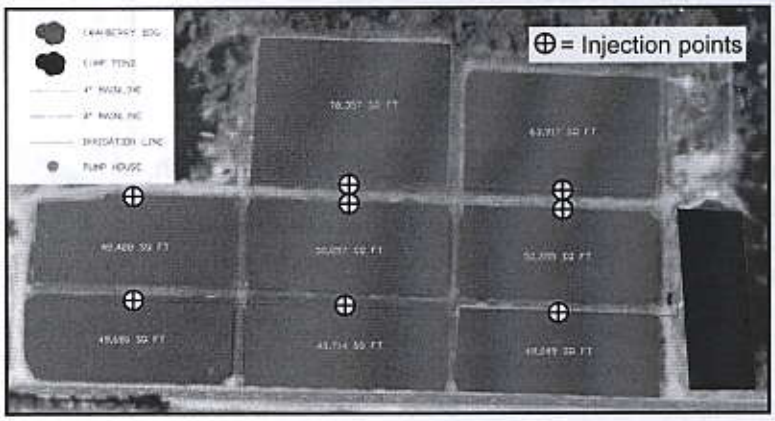


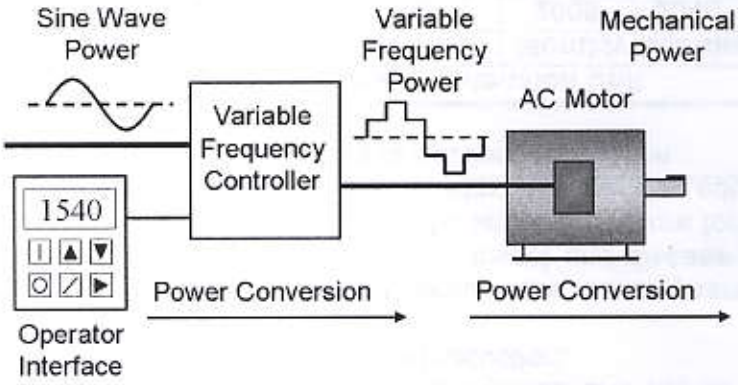
Figure 9. To reduce travel and rinse times, the injection point was moved from the pump house to satellite points on individual beds.

Variable Frequency Drives (VFD)

By Leigh Nelson, USDA NRCS State Irrigation Engineer

Where multiple fields or systems are irrigated with one pump it is possible to have a range of flows as fields or bogs are shut off or turned on. For irrigation, the motor and pump are sized to provide a designed flow rate at a specific pressure. Since the motor runs at a constant speed, when the flow is varied, the pressure adjusts. Generally, this is inversely related, decreased flow results in increased pressure, and vice versa. The motor and pump systems used for irrigation are based on a design flow. In order to ensure that there is adequate water the pump flow rate and pressure will be slightly greater than the design flow rate. In situations where the flow rate varies during different conditions, a variable frequency drive (VFD) can be added to the motor to slow the motor down when the flow rate decreases.

A VFD can be preset to maintain a certain pressure and the speed of the motor adjusts as the flow varies. This technology is tried and proven on single and three phase motors. The use of a VFD and proper electrical protection can save energy and increase the life of the pump. Typically this type of technology can also reduce pressure during start up and surges.



VFD and Motor General Layout

A VFD should **only** be installed where there is a variation of flow in the system. The amount of time the motor is operated at less than 100% of its rated speed is when the VFD saves the irrigator money. Otherwise, if the VFD is continually operated at 100% speed, the irrigator will actually pay more for energy due to the efficiency penalty of the VFD (VFD's are 95 to 97% efficient). The benefit of adding a VFD will depend on the amount of flow variation and time the flow is varied. A VFD could be added to most pumping plants in order to match the flow and pressure with the actual field water use.

Without the option to vary the flow to save power, the irrigator would either run the system at full capacity and over water some of the crops or waste power if a bog is shut down. With the VFD tied into the system, water application decisions can be based on the crop need since running the pump at full flow is not necessary. The VFD will adjust the motor and pump speed to keep the pressure constant. The VFD will also make it more feasible for chemical injection. Individual fields or bogs can easily be the injection point for quick application times. This will save energy for the landowner and improve chemical efficiency.

The cost for the VFD modification to existing or new motors varies with the horse power required. Checking around for costs, VFD's installed on either an existing or new motor is from $75 to $300 per hp. Besides the benefit of the energy savings there could also be energy credits for the landowner from the local power company for this type of conversion.

Slowing the speed of the motor, should increase the life of the pump, reduce maintenance, reduce water use, increase utilization of fertilizers and chemicals, and increase yields and quality of agriculture products.

Rinse time and wash-off time should be as short as possible. Generally, the targeted rinse time on beds of three acres or less is 2 to 2½ minutes. For larger beds, rinse time should not exceed 10 minutes. Wash-off time should be 5 minutes or less. For foliar or fruit placement, wash-off times can be as short as 2 to 3 minutes. As written above, pesticide labels may specify the rinse and flush times (Figure 8). Also of issue is the amount of water that the applicator is limited to in applying the product. For Intrepid 2F (Figure 8), the 900-gallon restriction is equivalent to 0.033 acre-inch.

To ensure product effectiveness by minimizing rinse and wash-off times or to remain compliant with pesticide label provisions regarding irrigation application depth or flush times, the injection site may need to be moved. Or, rather than injection from a single injection point, satellite injection points may need to be installed on the irrigation mainline or on submains (Figure 9). Injection points at each bed allow each bed to be treated separately, and more quickly and effectively.

For additional information on timing your irrigation system, please contact Kim Patten at pattenk@wsu.edu or 360-642-2031.

Weather: Historically high yields trends in the state are correlated with high cumulative growing degree days for February through April. This year those values are once again low. Even with a decent May, we are still behind in cumulative growing degree days for this year. With the numerous frost nights we had this spring, I expect subtle and not so-subtle tip and flower damage to also potentially affect our overall state production.

Plant phenology isn't too much different from previous cool season years. This summer is not predicted to be particularly warm. Plan on similar insect and disease phenology and spray timings as in previous below cool years. To get the latest agriculture forecast and predictions, consider subscribing to WSU's AgWeatherNet at http://weather.wsu.edu/is/. See page 3 for further instructions on subscribing and using this weather information.

WEATHER HISTORY – WSU Long Beach Research and Extension Unit

Precipitation (inches per month)							**Monthly Growing Degree Days (based 45°)**				
Month	**2009**	**2010**	**2011**	**2012**	**20 yr. ave.***		**2009**	**2010**	**2011**	**2012**	**20 yr. ave.***
January	9.6	13.2	12.2	12.4	12.1		23	83	28	21	46
February	3.7	8.2	7.8	7.1	7.4		20	56	4	43	38
March	7.7	9.5	10.6	15.6	9.3		10	72	22	29	62
April	4.2	7.9	8.4	9.2	6.4		61	92	29	103	110
May	4.8	3.9	4.8	4.7	3.9		214	180	158	182	238
June	0.7	4.9	1.9		*2.9*		361	290	323		*340*
July	0.8	0.9	2.3		*1.2*		427	377	414		*448*
August	1.6	1.5	0.4		*1.6*		463	411	453		*458*
September	3.3	5.6	3.3		*2.5*		401	382	370		*379*
October	8.2	7.8	5.4		*7.2*		184	220	205		*215*
November	20.3	13.2	10.4		*12.1*		71	85	28		*87*
December	6.2	14.7	4.6		*12.3*		27	35	9		*118*
Totals	71.0	91.4	72.2				2263	2283	2043		

***20 year averages for June-December are for 2011. The other months are for 2012.**

WSU - Long Beach Research & Extension Unit
2907 Pioneer Road
Long Beach, WA 98631

RETURN SERVICE REQUESTED

WSU Cooperative Extension provides educational opportunities in agriculture and natural resources, family living, youth and community development, in cooperation with the USDA. Extension helps you put knowledge to work.

Cooperative Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, color, gender, national origin, religion, age, disability, and sexual orientation. Evidence of noncompliance may be reported through your local cooperative extension office. We welcome your suggestions to improve educational programs offered through this division of WSU.

COOPERATIVE EXTENSION
Washington State University
Long Beach Research and Extension Unit

Dr. Kim Patten, Extension Professor
Email: pattenk@ wsu.edu
Phone and fax; 360-642-2031
Mobile phone; 360-355-7864