

WASHINGTON STATE UNIVERSITY  
EXTENSION

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# CRANBERRY VINE

2907 Pioneer Road • Long Beach, WA 98631 • 360-642-2031 • pattenk@wsu.edu • longbeach.wsu.edu

WSU Long Beach Research and Extension Unit

May 2015

## MEETINGS

**Washington Cranberry Summer Field Day:** This summer we will be back up in Grayland at the Randy Rust Farm and the Grayland Community Center (2071 Cranberry Road, Grayland). The date will be Friday, August 7, 2015 from 9 a.m. to 2 p.m., with registration at 8:30 a.m. Three pesticide credits will be given. It will be a great opportunity to see equipment for wet picking fresh fruit and other new noteworthy equipment.

**Washington Cranberry Variety Tour:** An informal tour of the variety plots at PCCRF will be held on Friday, September 11 from 10 a.m. to 12 noon. Can't figure out what to plant? This will showcase the relative difference in fruit quality and yield in all the new varieties.

Dr. Nick Vorsa of Rutgers University will be here to provide insight on how the varieties are doing in other regions and what selection would best fit your needs. An optional tour afterwards of growers' beds with some of these selections will also be available.

**Oregon Cranberry Summer Field Day:** The 2015 Oregon Field Day will be Saturday, June 20, 2015 at the Bandon Barn. Call 541-572-5263 for more information.

**Oregon Cranberry Variety Tour:** A tour of the variety plots at Bob Donaldson's farm will be on Thursday, September 10, 2015 from 4 to 7 pm. Call 541-572-5263 for more information.

**British Columbia Summer Field Day:** Tuesday September 8, 2015. This field day will feature the BC Cranberry Research Station and the variety trials on that site. Call the BC Cranberry Marketing Commission at 604-307-1046 for details.

**Deadlines:** Last day to sign up for Federal 2016 EQIP PROJECT funding is July 17 2015. If you've never signed up before, you need to get a DUNS and SAM number. These may take months to obtain, so don't wait for the last minute. Call Nick Somero at 360-875-6300 for more information. There are state funds available through the Grays Harbor and Pacific County Conservation District Commissions for 75 to 90% cost-sharing on chemigation units and other related items. Call Megan at the Conservation District 360-875-9424 to get the paperwork to sign up for 2016 implementation. These are separate funds from EQIP, so you'll want to make sure you sign up for both.

There is also an effort to put together a special initiative for NRCS funding that is a watershed approach for common issues that affect all cranberry growers in Long Beach,



Grayland and the North Beach area. Give Nick a call if you want to participate in that effort.

## RESOURCES

**Cranberry Irrigation:** WSU has two updated online extension publications that should be useful. Scientific Irrigation Scheduling:

<http://drought.wsu.edu/pdf/em4825.pdf>

Set-Move and Permanent Sprinkle Irrigation Systems:

<http://cru.cahe.wsu.edu/CEPublications/em4832/em4832.pdf>

**Cranberry Nutrition:** Dr. John Hart, recently retired from OSU, has updated the Cranberry Nutrition Handbook. It is an absolute must read guide for every cranberry grower.

<https://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/54896/em8672.pdf>

**Production Cost:** The University of Massachusetts has a new fact sheet: Reducing Costs in Cranberry Management is available for download at the following site:

<http://www.umass.edu/cranberry/downloads/Factsheet%202014%20Reducing%20Costs%20in%20Cranberry%20Management.pdf>

**Research Talks:** Copies of power point presentations made to the 2015 BC Cranberry Congress 2015 is on the Commission's website: [www.bccranberries.com](http://www.bccranberries.com).

## PEST MANAGEMENT

**Curio Herbicide:** The manufacture/registrant, NuFarm, is no longer going to support the Curio label. The WA SLN for use on cranberries expires on 12/31/15. A request to extend the SLN until 12/31/18 in order to use up existing stock has been submitted, and will likely be approved. Make sure you have the updated SLN for any use of Curio beyond

2015. Oregon's SLN for Curio is on a different time schedule and should be adequate to use up existing stock.

**Herbicide Spot Treatment:** Spot treating weeds with a backpack spray is an industry standard. That being said, everyone should know that the herbicide rate you use in a backpack depends on the spray volume you are applying. If you are on the heavy side you are going to get crop damage. Rule of thumb - at 50 gallons per acre (gpa) spray volume you should be able to cover a ~10' by 22' area with ~1 quart of water. At 100 gpa ~1 quart covers ~ 10 by 11'. At 50 gpa, spraying Callisto at 8 oz/ac rate requires 20 ml of product in 4 gallons. Use half that rate if you are spraying at 100 gpa. If you have a crew doing your backpack spraying, you need to make sure they are all applying at approximately the same volume.

**Tipworm:** Based on our 2014 data, two to three well-timed applications of Sevin to control first generation tipworm prior to bloom could provide reasonable suppression of subsequent generations of tipworm populations and their effects on cranberry apical meristems. The use of Sevin during bloom must be avoided due to risk to pollinators. Because Sevin has residue issues, consult your handler for any uses after bloom.

If you have second generation tipworm problems, then your options are limited based on if you are export qualified or not, have implemented BMPs for surface contamination, and have bees still on your beds. Most knock-down insecticide chemistries, such as Diazinon and Pyganic, provide some suppression if they are well timed. Ditto with Altacor and Delegate, but with lower efficacy.

Good timing is difficult once you get overlapping generations. Remember -- if you see damage it is too late to kill the tipworm in



that tip. It is best to tease open the vegetative tips and look for eggs and/or first instar larvae, and then treat. You'll need a good magnifying lens to see either one of these.

**Cranberry fungicides:** Growers cannot use chlorothalonil fungicides in 2015 to control fruit rot and twig blight unless they want to forgo the export incentive. You should consult your handlers for specific restrictions that apply for processed and fresh fruit. Fortunately, we have several good alternative fungicides available. A bulletin titled "Cranberry Fruit Rot Fungicide Scenarios" is attached to this newsletter that captures when and how to use these Bravo alternatives.

Below are my answers to a few frequently asked questions (FAQ) relating to this issue.

- *Why do I need to use a combination of Indar+Abound, or Indar+Proline? Isn't one by itself enough?* Fruit rot in the PNW is caused by several pathogens, including *Coleophoma*, *Colletotrichum*, *Physalospora* and *Allantophomopsis*. These fungicides by themselves have mixed efficacy on different pathogens. By using a combination of fungicides, you help assure you control most of pathogenic fungi of concern. Because these fungicides only have a single mode of action, a combination is also important for resistance management.
- *Is Proline better to use than Abound?* These fungicides are both in the same class and have a similar mode of action. Based on the research conducted to date on cranberry fruit rot in Wisconsin, Massachusetts and New Jersey, Proline has generally performed better than Abound. As far as cost per acre, Proline is a bit cheaper. However, a container of Proline is pretty pricey. For a grower with only a few acres who doesn't have a grand

to spend on fungicides, Abound might be a better option.

- *Are there any MRL issues associated with Proline, Abound or Indar?* No. Fruit residues, even at the PHI dates, are well below the limits that should cause any concern for export.
- *How early is too early to apply these fungicides?* Some growers still apply a spring clean-up spray. Technically you can do this with Bravo prior to May 15, as long as you coordinate with your handler. Unless you have upright dieback there is no need to treat with Bravo during this window. Neither is there any need to treat with Proline, Abound or Indar.

If you have Rose Bloom, treat with a copper fungicide instead. You are only allowed a limited number of applications per year of the new fungicide. Don't waste them applying too early.

- *When is the last date I should apply Proline, Abound or Indar?* **Obviously the PHI is the last date to apply, but the PHI should never be used a guide for timing.** Nevertheless we still hear of growers using that as a guideline. These products need to be used during the bloom period to have any efficacy on fruit rot. This is when infection is occurring. To prevent resistance to these fungicides it is also important that the last sprays of the season (those for twig blight) should be a broad spectrum fungicide- Dithane.

Should I use a sticker with Proline, Abound or Indar? When chemigating these fungicides, adding a product like Bond might improve efficacy. Regardless, only do so if indicated on the label.



- *As a fresh fruit grower should I use Bravo like I always have and accept a lower price for my fruit but have higher keeping quality, or do I experiment with the new fungicides and hope for the best?* Every bed is different. If what you are doing is working for you and you have low field and storage rot and high yield, maybe you shouldn't change. I have looked at side by side data from Wisconsin, Massachusetts and New Jersey comparing just Bravo with just Proline at the same early + mid-bloom timing window.
- The data shows Proline has less field rot than Bravo in 9 out of 11 studies, less storage rot in 3 out of 5 studies and higher or equal yield in 5 out of 5 studies. These results would suggest it is worth experimenting with the new alternative fungicide applied during bloom.
- *What do I do for twig blight control?* Two applications of Dithane 10 days apart starting at fruit set should work fine. Use three if you have a really bad infestation.
- *What is Tevano/Oso? Should I use it?* Tevano or Oso is a broad-spectrum fungicide derived through the fermentation of a naturally occurring microbe, with a unique mode of action. There is minimal data on cranberries. What there is suggests it has some efficacy for fruit rot. I would not rely on it exclusively for any of my disease control program. We are testing it this summer and will have some good data for next year.
- *Will we get Bravo back in 2016?* Maybe, but don't count on it.
- *I've heard mixed things about bloom-applied fungicide - it hurts the bees and it reduces yield. What's with this?* There are numerous new reports out that fungicides

are picked up on the pollen and transported back to the hive and could affect the fermentation process in bees' stomachs and can be detrimental to colony health. This is a new hypothesis, and could help explain colony collapse. The difference between fungicides has not really been assessed and it may or may not be germane to a plant like cranberries which doesn't have exposed pollen. As far as yield reduction with fungicide applied during bloom - it could definitely happen when application of Bravo is made by boom during high temperatures.

Many Midwest and East Coast growers have concerns about this. I've tried to induce this effect in Washington and have yet to see it. With our cool temperature and chemigation application method, it is highly unlikely to occur. With any of the new fungicides applied during bloom, getting crop damage has not been an issue.

- *I used Abound+Indar combination in previous years and still had high rot - Why?* Based on the Abound-Indar combination spray records I looked at, growers who had fruit rot problems with this combination sprayed too late or only used one application. If you wait until mid-bloom for your first application it will be too late, especially for varieties that bloomed early within your farm.

**Pesticide safety:** The International Agency for Research on Cancer (IARC) recently published that glyphosate is probably carcinogenic to humans (The Lancet Oncology, March 2015). This task force placed malathion, diazinon and glyphosate in the 2A category - "probably carcinogenic to humans." There is a raging debate within the scientific community about the validity of these findings.



I lack the expertise to contribute to this forum, but anyone using these chemistries should follow the precautionary principle. If you are hand spraying Roundup, don't do it in tennis shoes and without protective gloves (I've seen way too much of this). If you are chemigating diazinon, wear full protective gear when mixing and loading. As you've heard hundreds of times before, "proper protective equipment and procedures should be followed when any pesticide is used."

### **Resolving the Mystery of Protective Eyewear. (Courtesy of WSDA):**

Whether conditions inherent with a pesticide's formulation (e.g., airborne particles from a dry flowable or splash potential from a liquid) are created at time of mixing or a pesticide's likelihood to cause injury (e.g., acute toxicity, corrosiveness), pesticide labels may require protective eyewear for some or all of the tasks associated with a product's use. Besides the contact injury that may result, our eyes can readily absorb a pesticide. Therefore, when a product label requires protective eyewear, what qualifies?

To aggravate the confusion, pesticide labels may qualify protective eyewear as being safety glasses, goggles, or a face shield. Clarification of what comprises appropriate protective eyewear is provided by WAC 16-233-120(3) of the Worker Protection Standard. It reads: "When 'protective eyewear' is specified by the product labeling, it shall be one of the following types of eyewear: goggles; face shield; safety glasses with front, brow, and temple protection; or a full-face respirator."

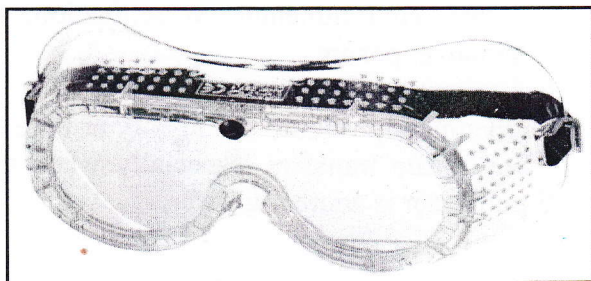


Figure 1. Direct ventilation goggles.

Very few safety glasses provide this degree of protection and, thus, are unsuitable. Although safety goggles offer front, brow, and temple protection, as a practical matter, the safety goggles should be a non-vented or indirect vented type. By allowing a direct flow of air from the work environment into the goggle, direct-vent goggles will not protect the user's eyes from liquid (splash, mist, or vapor) or airborne particle hazards (Figure 1). Open-vented goggles should be used for impact protection only.

Comparatively, indirect-vented goggles provide splash protection by means of a hooded or covered vent that allows the free movement of air but prevents the direct passage of a liquid (Figure 2). Non-vented goggles have no venting of any kind and offer protection against the passage of dust, mist, liquid, and vapors. For applications where chemical vapor or mist or dust is a potential hazard, a non-vented goggle will provide the required protection. (Note: non-vented goggles are NOT gas-proof goggles.)

Regardless of the type of ventilation, goggles with foam padding should not be used where

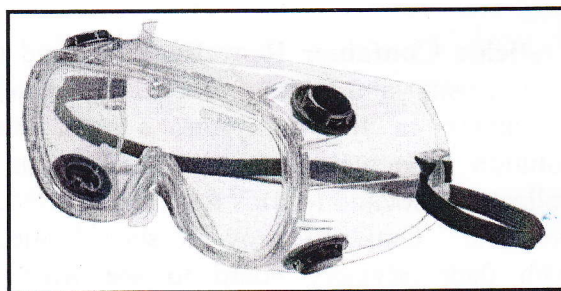


Figure 2. Indirect ventilation goggles.

chemical splash can occur. Chemicals can saturate the foam or cloth padding and cause chemical burns or an allergic skin reaction.

When selecting the appropriate goggle, an assessment should first be performed to determine the presence and nature of any workplace hazard. The Occupational Safety and Health Administration (OSHA) and the



Worker Protection Standard (WPS) require that employers ensure the safety of their employees by providing adequate eye and face protection whenever necessary.

Whether to ensure clear vision of the work area or to prevent skin irritation from pesticide residue, cleaning of safety goggles should be a routine practice. Care should be taken in cleaning goggles with anti-fog lenses, since the lens coating can be easily scratched or damaged. Oftentimes, rinsing the goggles with lukewarm water and allowing to air dry may be sufficient. For more extensive cleaning, a mild, unscented soap followed by a thorough rinse with lukewarm water and then air-drying is recommended.

Generally, face shields are worn when there is a high possibility that splashing of a pesticide will occur. It is recommended that face shields should not be worn without safety glasses or goggles. When selecting a face shield, consider models that allow replacement of the visor and cup inward beneath the chin to provide better protection from splashes. Headbands should be made of a nonabsorbent material.

**Pesticide Container Recycling:** Instead of triple rinsing and tossing your used pesticide containers in the dumpster, a far better solution is to recycle them. PCCRF has a collection location for the Long Beach growers. Grayland growers should check with their advisory board to see what is

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*Pesticide application records provide the peace of mind of knowing that answers are available if questions are asked.*

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available in the region. If you plan to recycle, make sure the label is removed, the thread and lip, handle and neck, and inside of the container are all clean, and the container is sliced so it can't be used. It is OK if there is

staining, but there should be no residue. The lids are not recyclable.

**Pesticide Spray Reports:** The following two sections (Pesticide Application Records & Spot Treating) were written by WSDA. They are based on finding of deficiencies in grower spray records made by WSDA compliance staff inspectors after they visited farms in the Grayland area in 2014. Complete and accurate pesticide record keeping is the law.

The deficiencies in pesticide applicator spray records that were noted are easy to remedy. Please read carefully to make sure you provide what they are requesting. Five versions of WSDA-generated record keeping forms are available online at this web address: <http://agr.wa.gov/PestFert/Pesticides/ComplianceActivities.aspx#Recordkeeping>. For cranberry producers, Version 2 will probably be the most applicable.

**Pesticide Application Records: More Than Just a Legal Requirement--It's Also a Good Management Practice (Courtesy of WSDA):**

Historically, applicators have viewed pesticide application records as a requirement – and not much more. However, pesticide recordkeeping can benefit applicators in unanticipated ways, provided that all of the required elements are recorded. A few unexpected advantages include:

- Liability protection or defense from unwarranted insurance claims arising from alleged accusations of wrongful use, such as drift or overspray, involving crop injury, environmental contamination, or human exposure.
- Document pesticide use history at time of real estate transfers, especially when the purchaser is another grower.



- Verify management decisions or evaluate performance concerning product selection in managing a pest.
- Prevent (by means of the restricted entry interval, or REI) or treat human exposure associated with pesticide residue.
- Traceability regarding food safety and documenting compliance with maximum residue levels (MRLs), which is often associated with a label-required pre-harvest interval.
- Accountability in demonstrating adoption of sustainable practices (e.g., lower toxicity pesticides, pest resistance procedures) or compliance with control points and compliance criteria for various quality assurance programs.
- Critical information for emergency services in the event of fire, theft, or an accident.

There is not one specific record-keeping format. Records may be kept on any form or in any format as long as all the required elements are reported. Thus, an applicator may use computer software (e.g., Agrian Product Use Report, Excel database), paper form (e.g., a WSDA or grower-derived record), or even a smartphone application. However, when an official WSDA pesticide application record request is issued to an applicator, WSDA will require that the information be submitted on a prescribed form – either a WSDA adopted or an approved form

However, the usefulness of a pesticide record is limited by the accuracy of the information that it contains. Of the 12 elements that must be reported by a cranberry grower, there are three that seem to be the most problematic: application rate, total amount, and, especially, concentration. Uncertainty in reporting this

information is undoubtedly attributed to the uniqueness of pesticide applications to cranberry bogs.

As an example, to control blackheaded fireworm, a decision was made to apply 4 ounces per acre of Altacor® (DuPont) to a 2.5 acre bog. In the “Directions for Sprinkler Chemigation” section, the pesticide label reads: “For overhead sprinkler systems that are stationary, add the solution containing ALTACOR® to the irrigation water line and apply no more than 0.2 inches of water per acre.”



Given this information, the following elements can be entered into the pesticide application record. The practice of mixing the product into a batch tank prior to chemigation is not reflected in the application record, but its reporting can be useful. Labels may also stipulate a maximum volume of water that can be applied during a chemigation application.

For example, the Intrepid 2F (Dow AgroSciences) label specifies that the volume of water cannot exceed 900 gallons per acre, noting only enough water should be applied to thoroughly wet the plants but not the soil. Admire Pro (Bayer CropScience) has a similar restriction of 600 to 1,000 gallons per acre. This is approximately 0.03 acre-inch.

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For concentration, either acre-inch or gallons per acre of water applied must be reported.

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Remember: Although someone else may record the information for your application record, it is the responsibility of the person applying the pesticide to make certain that an accurate record of the application is made.



Information	Rate	Concentration*
Pesticide Label	4 ounces/acre	.2 acre-inch or 5,430 gallons/acre
Record Entry	4 ounces/acre	4 oz./2 acre-inch or 4 oz./5,430 gallons
Total amount applied: 2.5 acres x 4 oz/ac = 10 fl. oz.		
* 1 acre-inch = 27,154 gallons		

**Spot Treating Areas – When must Pesticide Application Records be Kept and Then What? (Courtesy of WSDA)** Spot treatment is an application method used primarily for weed control, both noncropland and cropland, on small, selected areas. However, defining “spot treatment” is not the determining factor as to when a pesticide record of the application must be kept.

The requirements for application records are listed in RCW 17.21.100(1) of the Washington Pesticide Application Act and WAC 16-228-1320(1) of the General Pesticide Rules. These statutes require that pesticide application records must be kept given the following conditions.

- All certified applicators who apply pesticides.
- All persons applying pesticides to more than one acre of agricultural land in a calendar year, including public entities engaged in roadside spraying of pesticides.
- Unlicensed pesticide users when performing landscape applicators to sites including, but not limited to, schools, day

cares, apartment complexes, shopping centers, golf courses, and parks.

Most cranberry producers are WSDA-certified pesticide applicators. If not, spot treatments made by unlicensed individuals to cropland will invariably exceed one acre during a calendar year.



Pesticide application information as required

by international or national food safety programs – for instance, USDA GAP or GlobalG.A.P. – differ when compared to the WSDA reporting elements. Consequently, an assumption cannot be made that adhering to control points and compliance criteria for GlobalG.A.P. will qualify for pesticide record keeping requirements in Washington State law and rule.

When completing the pesticide application record for a spot treatment, the field drawn onto the grid map (that is a part of the WSDA record form) does not need to be drawn to scale. Of importance is that sufficient landmarks are noted on the map to locate the treatment site.

**Note:** To use Altacor, the applicator must know the flow rate of the bog's irrigation system.

Oftentimes, in lieu of the grid map, growers will print off an aerial photograph (using Bing, Google Earth, Terrain Navigator Pro, etc.) of the field or general area. The field onto which a spot treatment was made is outlined or shaded. A notation next to the map on the pesticide record could merely read “Refer to the attached map.”



For the "Acres Treated" entry, simply write "Spot treatment on the 2-acre bog." Similarly, for "Rate per Acre," record "Spot treatment." Neither of these values can be calculated with certainty.

As to the concentration, many labels in the "APPLICATION INFORMATION – Spot Treatment" section will specify a product volume to water volume ratio. For example, the Select EC® label reads: "When using hand sprayers or high volume sprayers utilizing hand guns, mix 1/4% to 1/2% (0.33 oz. to 0.65 oz. per gal.) Select 2 EC and treat to wet vegetation, while not allowing runoff of spray solution." Thus, if the 1/2% volume (product)-to-volume (water) solution is used, concentration should be reported as either 1/2% or 0.65 ounce per gallon. If the spot treatment required a 2½-gallon tank mix, the "Total Product Applied" would be 1.6 fluid ounces.

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**Remember:** The pesticide application record must be completed the day that the application was made.

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## FARM MANAGEMENT

**PVC Glue:** When gluing PVC pipe you have two primary options for pipe glue; the blue (wet and fast) and the gray. Both have their advantages and disadvantages depending on the application. The blue glue sets fast and can be used on fittings that can not be completely dried; however, it is not as strong or hard as the gray glue when set. The blue should be used primarily on sprinkler risers and laterals when a repair must be made quickly and/or you can't get the joints dry.

The glue does have a tendency to "flake off" the excess and can plug sprinkler heads. The gray forms a stronger bond than the blue and hardens slower. It can only be applied to dry pipe and will not set under water. It is best

used on pump intakes and mainlines. It takes 24 hours to fully harden.

You should also always use a primer on both ends of the pipes being connected. The primer removes the graze surface of the PVC which helps the PVC glue penetrate the surfaces and form a better weld.

**Best way to remove a crop:** With low prices some growers might not want to produce any fruit. Aside from not frost protecting, a short 2-4 day flood during peak bloom can be used to suffocate the flowers. No fruit will be set, and vines are not injured. Time the flood to begin when most flowers have opened or are at the pinhead stage (unopened pods will survive the flood) – approximately 80% out of bloom. Depending on how well bloom is synchronized, you may need to repeat this flood several times.

**Sprinkler Flow Rate:** Using the standard guidebooks is one way to know flow. It can be way off if the system is under pressure. The information below is from the WSU Extension Irrigation publication mentioned under Resources. "Use the hose over the operating sprinkler nozzle to direct water from the sprinkler into the 5-gallon bucket or other container. Measure the time it takes to gather this known volume of water. Convert the volume and time into the sprinkler flow rate in gallons per minute."

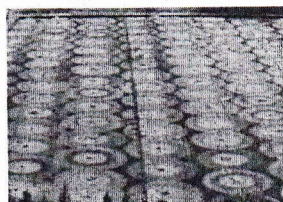
For instance, 5 gallons collected in 45 seconds equals (5 gal x 60 sec/min divided by 45 sec) 6.7 gpm. For best uniformity, there should be no more than 10% difference in flow rates from one head to another operating at the same time on the system.'

'Use sprinkler flow rate to determine the sprinkler application rate and eventually the depth applied.' To accomplish this, measure the sprinkler spacings on the lateral and the lateral spacings on the mainline (both in feet). This applies equally to all types of spacings--



square, rectangular and diamond. The average gross application rate under the sprinkler (inches per hour) equals: sprinkler gpm x 96.3 sprinkler spacing (ft) x lateral spacing (ft). Multiply this by the set time in hours to find gross depth applied.'

**Sprinkler uniformity.** Beside uneven irrigation, poor sprinkler uniformity can account for reduced crop by reducing the effectiveness of frost damage and all pesticide and fertilizer



applications through the sprinkler system. I can talk about it this and runs lots of uniformity tests on beds, but a picture is more valuable. The above photo is of a cranberry bed taken this spring during a frost event. It is a good example of why we need to assess and change our systems.

You can also get a decent image of sprinkler uniformity on your farm by looking at your farm on Goggle Earth. This sometime requires you to click through different historic satellite images to find one that shows color patterns on beds. If you find your uniformity is wanting, you should strongly consider signing up for EQIP funding to see if you qualify for retrofitting your irrigation system to improve uniformity.

**Umbrella bloom.** This is when the uprights flower, but there are no vegetative shoots. The most common cause of umbrella bloom is early frost damage. The newly emerging vegetative tips are extremely sensitive to frost and can get easily nipped when temperatures drop below 32 degrees for a short time period. Eventually side shoots form and grow, but production is significantly reduced. I've heard from numerous growers in Oregon about widespread umbrella bloom this spring. These growers are convinced that there was

no frost event that could have caused this damage. Other causes of umbrella bloom are low chilling hours. I've never seen it in cranberries, but when this happens in blueberries the symptoms include delayed flowering and leafing, unsynchronized flowering and leafing from different buds on the same branch and flower bud abortion.

Many of the symptoms I am hearing about in Oregon, flowering before leafing and considerable variation in upright growth patterns, suggest that their lack of chilling units this winter might be causing the problem. According to Cassie Bouska, OSU Extension, the Bandon region had only ~ half the average chilling hours this winter than it has in the past 23 years (since 1991).

The influence of low chilling on cranberries has been poorly studied. The old studies suggest that there is a variatal effect, but there is no data on how this relates to the modern varieties. The data below is per cent umbrella bloom collected from the variety trials in Oregon this spring. These results indicate Pilgrim, Stevens and Mullica Queen have a high level of affected uprights in Oregon.

If it was early frost damage causing umbrella bloom I would suspect that more of the advanced hybrids, which have earlier bud break than Stevens and Pilgrim, would show more affected uprights.

Variety	% Umbrella bloom
Pilgrim	20
Stevens	17
Willapa Red	5
Yellow River	3
Grygleski 1	3
Crimson Queen	5
Demoranville	4
Mullica Queen	25
Haines	3
Welker	7



I've collected similar data for Washington this spring and this is exactly what the data did show. Crimson Queen and Mullica Queen had higher levels of umbrella bloom than standard varieties. The low 20's in March might have nipped a few early vegetative buds, or, alternatively, as some growers in Washington are suggesting, the 15° F bed temperature on November 14 might have caused some of that damage.

Another potential cause of umbrella bloom is feeding from cranberry tipworm. Oregon has not previously had problems with tipworm, but it is notoriously difficult to pick out if you don't know what you are looking for. If it was an early frost, check for patterns – more damage in the low spots.

At this point in time I am going to fall back on the principles of Occam's razor. William of Ockham was a 12<sup>th</sup> century English Franciscan friar who developed one of my favorite scientific principles. It states that among competing hypotheses that predict equally well, the one with the fewest assumptions should be selected. In other words, simpler theories are preferable to more complex ones because they are better testable and less falsifiable.

Before we assume low chilling caused umbrella bloom, let's make sure we didn't get early frost damage or that we don't have tipworm. If it was an early frost, check for patterns – more damage in the low spots, etc.

Later this spring double check for tip cupping and tipworm larvae. If you don't know what it looks like there are plenty of photos on-line. If frost and tipworm damage are both negative then low chilling units could be an issue. There are chemical methods that can be used to substitute for low chilling. They have never been used in cranberries, but might be worth investigating if this is an on-going issue.

## WEATHER

**Weather Station in Grayland.** A WSU Agweathernet station has been installed in Grayland next to a cranberry bed. <http://weather.wsu.edu/>. This station was made possible through the generous financial support provided by WSDA Specialty Crop Block Grant Program, Pacific Coast Cranberry Research Foundation and Grayland Cranberry Growers Association. This device is a great tool for cranberry growers once they become friendly with it. It is great for scheduling irrigation and has a profile for cranberries.

One of the most useful features is the bed temperature sensor. It is at vine tip level and provides real time bed temperature. This can be used to send you text or email alerts whenever the temperature is below or above the level you set the alert for. While the temperature won't be exactly the same as your beds, it will match closely enough and get you out of bed on a frost night to check that your system is working.

There are lots of other features on it, including an irrigation scheduler, a widget for your phone or computer, and an historic record of all data. The later has proven useful on several crop insurance claims. This system is the same as we have in Long Beach.

**Growing degrees days (GGD).** Historically (past 25 years), the mean average yield for WA growers is highest when we have high GGD for February through April. I hate to make yield forecasts, but based on GGD it could be a good year. The GGD for February through the end of April for 2009, 2010, 2011, 2012, 2013, 2014 and 2015 was 76, 265, 73, 156, 153, 214, and 329, respectively. Hopefully having an early GGD twice the average of the past 6 years is predictive of a great harvest.



In addition, the massive pool of warm water off the west coast of North America, called "the blob," is predicted to result in a warmer

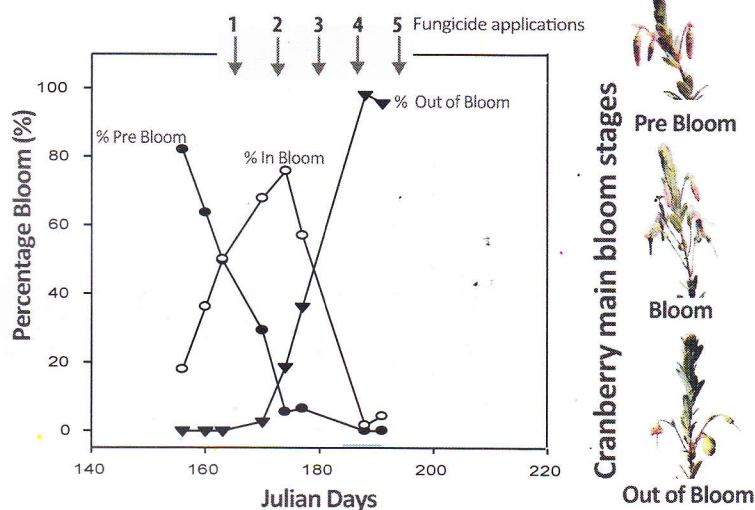
than average summer. This is also a good omen for a better than average crop.

<b>WEATHER HISTORY – WSU Long Beach Research and Extension Unit</b>										
<b>Precipitation (inches per month)</b>						<b>Monthly Growing Degree Days (based 45°)</b>				
Month	2012	2013	2014	2015	20 yr. Ave.	2012	2013	2014	2015	20 yr. Ave.
January	12.4	10.2	5.9	9.5	11.8	21	3	16	65	40
February	7.1	6.5	7.5	6.6	7.4	43	9	24	139	37
March	15.6	6.6	13.3	7.3	9.5	29	57	86	121	59
April	9.2	6.4	7.3	4.1	6.2	103	90	141	114	105
May	4.7	5.3	5.9			182	249	382		
June	4.1	2.5	3.3			290	326	356		
July	1.1	0.2	1.2			397	408	462		
August	0.3	2.4	1.5			468	235	474		
September	0.5	8.2	3.5			350	429	478		
October	12.7	3.0	11.8			179	177	354		
November	13.0	13.0	9.3			103	64	120		
December	18.5	4.6	12.5			26	8	97		
Totals	99.2	68.9	82.9			2191	2055	2990		



# Cranberry Fruit Rot Fungicide Scenarios

## When should you time your sprays?



## Fungicide application overview

- ★ Adequate fruit rot control can be achieved by timing fungicide applications during key periods of cranberry development (see figure to the left).
- ★ Fungicide applications 1-3 are considered critical for adequate fruit rot control, whereas additional applications (4-5) will depend on disease pressure and risk factors.
- ★ The scenarios below were developed considering fungicide restrictions, efficacy, phytotoxicity, and fungicide resistance management.

## Fungicide scenarios w and w/o Bravo

Bravo	No Bravo
<b>At bloom every 7-10 days:</b> <ol style="list-style-type: none"> <li>Indar/Abound</li> <li>Indar/Abound</li> </ol>	<b>At bloom every 7-10 days:</b> <ol style="list-style-type: none"> <li>Indar/Abound</li> <li>Indar/Abound</li> </ol>
<b>Out of bloom every 10-14 days:</b> <ol style="list-style-type: none"> <li>Bravo</li> <li>Bravo</li> <li>Bravo</li> </ol>	<b>Out of bloom every 10-14 days:</b> <ol style="list-style-type: none"> <li>Dithane <b>OR</b> 3. Dithane</li> <li>Dithane</li> <li>Tavano</li> <li>Dithane</li> <li>Tavano</li> </ol>
★ Bravo can cause phytotoxicity if applied during bloom period. Program should not be used if MRLs are a concern.	★ Mancozeb (Dithane & Manzate) can affect TAcys. Efficacy data for Tavano are only available for NJ

## Risk factors

### High- Moderate

Region (NJ and MA)  
 High fruit rot incidence  
 Newly established bed  
 Susceptible varieties  
 Fresh fruit market  
 High yield (>350 bbl/acre)  
 Frequent scald conditions

## Questions?

### New Jersey

**Peter V. Oudemans**  
 Marucci Center  
 for Research  
 Rutgers University  
 oudemans@rutgers.edu  
 Phone: 609-204-2371

### Massachusetts

**Erika Saalau Rojas**  
 Cranberry Station  
 UMass-Amherst  
 esaalau@umass.edu  
 Phone: 508-295-2212  
 Ext. 18 & 19

### Wisconsin

**Patricia McManus**  
 University of  
 Wisconsin-Madison  
 psm@plantpath.wisc.edu  
 Phone: 608-265-2047

### Washington

**Kim Patten**  
 Washington State  
 University Extension  
 pattenk@wsu.edu  
 Phone: 360-642-2031

Bravo	No Bravo
<b>At bloom every 7-10 days:</b> <ol style="list-style-type: none"> <li>Indar/Abound</li> <li>Indar/Abound</li> </ol>	<b>At bloom every 7-10 days:</b> <ol style="list-style-type: none"> <li>Indar/Abound</li> <li>Indar/Abound</li> </ol>
<b>Out of bloom every 10-14 days:</b> <ol style="list-style-type: none"> <li>Bravo</li> </ol>	<b>Out of bloom every 10-14 days:</b> <ol style="list-style-type: none"> <li>Dithane <b>OR</b> 3. Tavano</li> </ol>
Add a 4 <sup>th</sup> application of Bravo if disease pressure is high	Add a 4 <sup>th</sup> application of Dithane or Tavano if disease pressure is high

### Moderate

Region (NJ, MA, OR, WA, WI, and BC)  
 Moderate fruit rot incidence  
 Resistant varieties  
 Sporadic scald conditions

### Low

Region (WI and QC)  
 Low fruit rot incidence  
 Resistant varieties  
 Rare scald conditions

## FRAC 3 and 11 only

Expect fruit rot control to decrease by 50% when compared to approaches listed above.

Applications during bloom ONLY at 7-10 day intervals

Option 1	Option 2	Option 3	Option 4
1. Indar/Abound	1. Proline/Abound	1. Indar/Envito	1. Proline/Envito
2. Indar/Abound	2. Proline/Abound	2. Indar/Envito	2. Proline/Envito

- ★ For more information about other products and region-specific fruit rot recommendations, please contact your local Extension Plant Pathologist or Cranberry Specialist.