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 • longbeach.wsu.edu

April 2016

MEETINGS

Washington Cranberry Summer Field Day: This summer we will be at the PCCRF Farm on Friday, July 29, 2016, from 9 a.m. to 2 p.m., with registration at 8:30 a.m. Three pesticide credits will be given.

Oregon Cranberry Summer Field Day: The 2016 Oregon Field Day will be Tuesday August 2, 2016. Call 541-572-5263 for more information.

PESTICIDES

Product status:

Lorsban: Use up existing stock.

Curio herbicide: WA SLN for use on cranberries has been extended for another 3 years. Supplies are limited and you are on our own finding product.

Quinstar: Growers will be able to use Quinstar in 2017 and be export qualified. You can use it this year, but consult your handler first regarding impacts to your crop payment.

Bravo: No MRL issues this year, but don't use after July 25th. For Canadian growers it is not an option. Many experts I talk to in the states suggest that its use on cranberries is likely to go away over the long term.

Insecticides acutely toxic to bees: We are lucky; EPA has not issued a ruling on pesticide usage during bloom for the 2016 season. This would have made any use of Avaunt during bloom illegal. Nevertheless, as I stated before, with the exception of Altacor and Intrepid, all other cranberry insecticides are considered acutely toxic to honeybees. Don't use during bloom.

Cost to treat an acre: Prices have changed some since I last did this calculation. Below is the cost per acre growers are currently paying based on the current pricing sheet. It is interesting to note that the new fungicides are cheaper than the old ones.

Product	$/ac
Proline	22
Abound	23
Indar	24
Bravo	32
Dithane	34
Callisto	30
Volunteer	3
Stinger	15
Diazinon	30
Altacor	52
Intrepid	27
Acephate	8
Sevin	24

Also based on price alone, Intrepid is a better deal than Diazinon. This does not include all the extra benefits of not having a negative effect on bees, beneficial parasitoids, and surface water quality, etc.

Spring cleanup of unwanted and unused pesticides: The WSDA is offering the same pesticide disposal offer for cranberry growers as in previous years. To apply for this great program email WastePesticide@agr.wa.gov or call 360-902-2056 or visit the website http://agr.wa.gov/PestFert/Pesticides/WastePesticide_apply.aspx .

Fungicide resistance: If you recall we have been preaching about the need to use different classes (FRAC) of fungicides to avoid resistance. The use of the same product with a single mode of action, such as Abound, over and over again can quickly result in resistance. It has apparently already happened. One grower who has been using only Abound for three years in a row has had his fruit rot significantly increase every year. Remember - both Indar and Proline are FRAC 3. That means they have the same mode of action – don't use them back to back. Rotate with Abound (FRAC 11) or a broad spectrum fungicide like Bravo or Mancozeb.

Herbicide resistance: Equally important to avoiding pesticide resistant pathogens is avoiding herbicide – resistance weeds. We have a new publication out titled "Avoiding herbicide-resistant weeds in cranberries." The herbicides most problematic are Select, Curio, 2,4D, and Roundup. For more information read https://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/herb_resistance_cranberry.pdf

Cost sharing for pesticide sheds and chemigation units: Check with NRCS and the Conservation District for cost-share options on these two items.

Sprayer clean-out: If you are like me you might have been using a backpack sprayer and accidentally put a spray on your wife's roses that had a little Roundup residue left in it. Whoops – sorry honey. With the use of herbicides that are active at low application rates, proper cleaning and maintenance of sprayers is pretty important. The quickest and easiest way to rinse a tank and spraying equipment and dispose of waste safely is to carry a container of fresh water with the spraying equipment. When spraying is finished, flush the system in the field and spray the rinsate on the field in a manner consistent with the product's intended use.

It is even better if you have sprayers dedicated for just one purpose, one for Roundup, and one for Stinger, for example. However, it is very common to see the glyphosate backpack sprayer used to also apply Stinger or Curio.

In that case, you need to use a cleaning agent that penetrates and dissolves pesticide residues and allows them to be removed when the rinsate is removed from the sprayer. Commercial tank cleaning agents and detergents help remove both water- and oil-soluble herbicides and are recommended on many pesticide labels. The commercial tank cleaning agents usually perform better than household detergents and can deactivate some herbicides in addition to solubilizing them.

The following procedure is recommended for all herbicides unless the label specifies a different cleanout procedure. Add one-half tank of fresh water and flush tanks, lines, booms and nozzles for at least 5 minutes. Then refill the tank with water containing a 1% solution of household ammonia or 1 to 2 oz of trisodium phosphate cleaner detergent per gallon of water. Operate the spray booms long enough to ensure that all

nozzles and boom lines are filled with the cleaning solution. Let the solution stand in the system for several hours, preferably overnight. Agitate and spray the solution onto an area suitable for the rinsate solution.

Remove nozzles, screens, and strainers and clean separately in a bucket of cleaning agent and water. Finally, rinse and flush the system once again with clean water. Fuel oil or kerosene is effective for removing oil-soluble herbicides such as esters and emulsifiable concentrates. The fuel oil or kerosene should be followed by a detergent rinse to remove the oily residue. Some herbicides may require special clean out procedures. The label should be consulted.

PEST MANAGEMENT

Scale: As mentioned in the winter newsletter, farms throughout Southern Oregon are showing significant damage from several species of scale insect. If you obtained vines from Southern Oregon, inspect your beds this growing season for problems. Let us know if you see something you want us to check out. For an overview of cranberry scale and what to check for see http://www.umass.edu/cranberry/downloads/Scale%20updated%20June%202014.pdf .

Tipworm: 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. If you have second generation tipworm problems, then your options are limited based on if you are export qualified or not, are in Grayland and don't implement BMPs for surface water contamination, and/or still have bees 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 larvae. It is best to open tips, examine them and treat when you see egg-laying and first instar larvae. You'll need a good magnifying lens to see either one of these.

Fruit rot control: This is still an evolving science and it will take several more years of work before we can recommend on the most cost-beneficial fungicide program for fruit rot. Since handlers don't pay for rotten fruit, the price of putting out another $25/ac spray is minor compared to preventing $80 in crop loss due to rot (~1% rot on a 200 bbl/ac crop). To achieve good control of fruit rot it is critical to have continual fungicide protection during bloom. For west coast growers that means two sprays during bloom is often not enough to provide the needed protection over our six weeks of bloom.

The predominant pathogens for fruit rot in Washington are *Allantophomopsis*, *Coleophoma*, *Colletotrichum* and *Physalospora*. All of these have been isolated from cranberries during bloom in BC. Without fungicides during that time window, crop loss due to these organisms is inevitable. Overall, Proline has some of the best activities of all currently registered cranberry fungicides against at least three of these pathogens.

Our current recommendation is to use a rotation of three to four fungicides applied throughout the major part of bloom. For example, this could be Proline / Abound / Proline; Abound / Proline / Abound / Proline; Proline / Abound / Proline /Abound; etc. Bravo can be substituted for any of these fungicide sprays and Indar can be substituted for Proline. Some growers,

however, are not comfortable with applying Bravo during bloom and prefer to save their Bravo/Mancozeb for after fruit set (twig blight control).

Start your first application at early bloom and retreat every 5-7 days. Really warm temperatures during bloom will require a short interval between treatment windows. Not everyone needs to go overboard with four fungicide applications. If your packout records have consistently shown very low rot (<1%), then you might be fine with a reduced fungicide program during bloom. However, if you have had high rot, consider one of the strategies mentioned above.

The end game, however, is not rot control; it is total yield of marketable fruit and good keeping quality of fresh fruit. Of the four studies we did last year, the difference in yield of marketable fruit between untreated plots and two Proline+Abound treatments was consistently ~100 bbls/ac. We only did one study that compared Abound / Proline / Abound / Proline, all 5 days apart, to Abound + Proline twice 10 days apart. In that study we increased marketable yield by 100 bbl/ac with four applications compared to two.

It appears that, regardless of the effects that fungicides have on reducing fruit rot, they can also provide a yield response. You only need ~1/2 bbl/ac increase in yield to pay for each additional fungicide application. It seems like a good wager to me. Spend $50/ac for an extra two fungicide treatments, Proline followed by Abound, and have pretty good certainty of reducing rot and increasing yield.

PRODUCTION

Bumble bees. Many of you may recall watching a large bumble bee *(Bombus occidentalis)* with a white butt working your farms in the early 1990s. Our surveys back then indicated it was the major bumble bee species accounting for pollination in cranberries. It was a ground nester with very large colonies (often in the 1000's). The two other main species, *B. mixtus* and *B. melanopygus,* were smaller bees, red colored, and had much smaller colonies that fade out by mid-bloom.

Populations of *B. occidentalis* started to decline when the commercial bumble bee colonies were introduced around the mid-1990s. These commercial strains carried a disease called *Nosema bombi* that affected the native *B. occidentalis*. By the year 2000 *B. occidentalis* were all but gone from the cranberry growing regions of the west coast. A few can still be found inland, but for all extents and purposes they are extinct in our area. That threatened and endangered classification is now official. See http://www.iucnredlist.org/details/44937492/0 for more information.

To help preserve the native bumble bees we still recommend a bumble bee garden (see last issue of the Cranberry Vine), not using neonicotinoid insecticides (Admire), not spraying beds with acutely toxic insecticides when cranberries are in bloom or when weeds on the beds are blooming, and preserving as much native brush habitat around your farm as possible.

In addition, there is new data that indicates the fungicide Bravo impacts bumble bee colony health. Colonies exposed to the fungicide produced fewer workers, lower total bee biomass, and had lighter mother queens than control colonies. The authors suggest that fungicides negatively affect the colony success of a native bumble bee species and that the use of fungicides during bloom has the potential to severely impact

the success of native bumble bee populations foraging in agroecosystems.

Sprinkler uniformity and crop loss due to heat: I saw a lot of dead patches last fall due to heat stress, particularly along the edges, where there wasn't double sprinkler coverage. This summer should give us some more hot days. Without improving your irrigation system, the only way to compensate is over-irrigation, increased nozzle size or providing supplemental sprinklers to the areas that were prone to damage. Run a few cup tests this spring during a frost event to determine how much less water these dry areas are getting compared to the rest of the bed.

Umbrella bloom: As I've mentioned before, we suspect that winters with inadequate chilling units might be problematic for some of the Rutgers varieties. If you notice a high percentage of umbrella bloom this year, (particularly in Oregon) let me or Cassie Bouska (OSU) know; we would love to get more data.

Cranberry Varieties: I've gone on more than enough on varieties in previous newsletters. With the change in incentive towards large, firm, light-color "Craisin" cranberries, Pilgrim is still a top choice in my mind. The trouble is finding a good source of "true" Pilgrims. If you have some good Pilgrims, it might be worth making a "non-exhibit A" propagation bed out of them so you can mow over and over again to supply your vine needs in the future.

If you don't like that idea, there are some good new options on varieties that have just become available. Check out the selection from a private breeder in Wisconsin http://www.cranberryvine.com/cranberry-varieties) or those from Rutgers (http://www.integritypropagation.com/index.html). For your information, we are putting in a new small fresh fruit trial in Grayland. Stay tuned over the next 10 years for what we find.

Harvest time vs. fruit size, rot and color: I am sure you all remember how to solve three simultaneous arithmetic equations from high school. FYI – the kids these days cheat by using Wolfram|Alpha. The new incentive program for fruit from one the big handlers is basically requiring growers to solve these types of equations. When is the best time to harvest, if the highest Tacy incentive is early September, but fruit size continues to increase until early October, and fruit rot increases a little every week from mid-September on?

At this point in time, we don't have enough data to solve these equations for all varieties and conditions. However, we have enough information to make some guesses. Assuming you actually you have some options about harvest windows for each bed, or even care, here are my thoughts. We have Stevens fruit size (wt/berry) for the same beds for different harvest dates for the last 6 years. Each year and each bed is different, ranging from 0 to 6% increase in fruit weight between September 10 and October 8. As an example, if you have 100 bbl/ac on 9/10 and had a 3% increase, you would expect ~ 103 bbl/ac by 10/8. However, you also need to adjust for yield loss due to fruit rot, which is even more variable than fruit weight increase. For this purpose, let's assume there is 1% greater rot during that month.

For calculation purposes I'll use a 2% increase in fruit weight over that one month period and 1% increase in fruit rot. This would mean that for a 200 bbl/ac crop in mid-September, your total marketable fruit in mid-October would be 202 bbl/ac. If you assume a $38/bbl/ac base price for fruit with no incentives, a $2/bbl incentive for early

harvest sequence, a $2.50/bbl incentive for 35-45 Tacy, and only $1/bbl for Tacy >60, you can figure out the difference in returns between the two harvest dates.

For each 100 bbl/ac in yield the returns for an early harvest with maximum incentives would be $4250/ac. If you harvest one month later and have a net change of -0.5, 0, +1, +2, or +4% in yield of marketable fruit and only get $1/bbl incentive from Tacy, your net return for each 100 bbl/ac would be $3822, $3900, $3939, $3978, and $4056/ac respectively. These are all well under the $4250 from the early harvest. Basically, it would take a 9% increase in marketable yield for that one month to compensate for the differences in early harvest and higher Tacy incentives.

It is uncommon to obtain >9% increase in net marketable fruit between mid-September and mid-October. Therefore, if you can, try to capitalize on the early harvest and the 35 to 45 Tacy incentive. This is especially important if you have varieties, like Crimson Queen, that color early but also tend to have much higher rot if you harvest them late.

MISCELLANEOUS

Coastal erosion: The Department of Ecology Coastal Monitoring and Analysis Program has made predictions for shorelines for North Cove/Washaway Beach for the next 45 years. See adjacent photo. Additional information and the PowerPoint presentation can be found at the Pacific County DCD website. This is important for the cranberry industry not only because the southern section of beds in Grayland will be lost to the ocean, but it also makes the remaining farms in Grayland more subject to salt water intrusion from tidal water. Of course, it would also compromise transportation and overall commerce of the industry.

Current plans are for DOT to just continue to try to save State Route 105 for as long as possible. Significant federal funding will be required to do more than that. It is very important that growers contact their state and federal legislators on this issue.

Skin cancer: An annual visit to a dermatologist should be a priority for someone who has been farming for a long time. The damage was done many years ago; now you are waiting for it to express itself. Knowing that several of you won't take this advice, at least you can do your own self-examination. Squamous, basal cell and melanoma skin cancer all look a bit different so it is worthwhile reading up on them. Most importantly, stress to your children or grandchildren the need to prevent excessive sun exposure, to use ample broad spectrum (UVA/UVB) sunscreen and broad-rim hats, and that tans won't protect you from skin cancer.

Publications: The University of Wisconsin has a great new website loaded with really good cranberry information on lots of subjects. I highly recommend you take a look at it and while you are on the site sign up for their cranberry newsletter. See http://fruit.wisc.edu/cranberries/.

The University of Massachusetts 2016 Cranberry Chart Book is also essential reading and should be on every cranberry grower's shelf. Download it at http://ag.Umass.edu/cranberry/publications-resources/cranberry-chart-book.

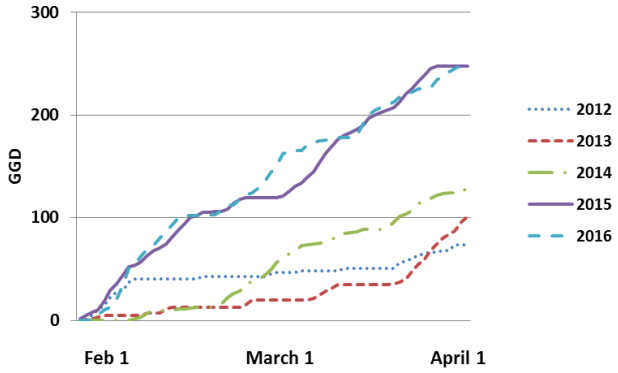
WEATHER

Weather prediction for next 20 years: According to the state climatologists at the U.W., the big circular mass of warm water off the west coast known as the "blob" is going to have profound changes in our local weather over the next 20 years. The blob, in combination with El Nino and other global climate factors, is predicted to make for warmer wet winters, and warm dry summers (similar to what we experienced in 2015).

Winter patterns to date are conforming to their predictions. For most growers on the west coast this should be positive, as the warm summer resulted in record high yields in 2015. For some growers, however, these predictions could have dire consequences. If you had water shortages for irrigation or harvest in 2015, you should be developing some contingencies for more water in later summer for the future. Warmer winters and springs also increase the need for early frost protection and timing of first sprays for fireworm.

Yield and growing degrees days (GDD). Historically (past 25 years), the mean average yield for WA growers is highest when we have high GDD for February through April. The graph below is just for February and March over the past 5 years. It looks like another good year.

Current weather: It has been a reasonably wet winter, with 79 inches of rain between



November and March (25 inches more than the past 20 year average). GDD were three times greater than the 20 year average for January to March.

WEATHER HISTORY – WSU Long Beach Research and Extension Unit									
Precipitation (inches per month)						Monthly Growing Degree Days (based 45°)			
Month	2014	2015	2016	20 Yr. Ave.		2014	2015	2016	20 Yr. Ave.
January	5.9	9.5	16.4	12.0		16	65	79	41
February	7.5	6.6	11.9	7.4		24	139	129	40
March	13.3	7.3	14.0	10.0		86	121	117	59
April	7.3	4.1		6.2		141	114		105
May	5.9	1.3		3.9		382	248		236
June	3.3	0.4		2.8		356	367		332
July	1.2	0.2		1.2		462	533		438
August	1.5	2.5		1.7		474	532		446
September	3.5	2.4		2.8		478	367		371
October	11.8	5.1		7.5		354	350		225
November	9.3	17.0		12.2		120	77		85
December	12.5	19.8		12.4		97	60		34
Totals	82.9	76.1	42.3			2990	2972	325	