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CRANBERRY VINE

WSU Long Beach Research and Extension Unit
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January 2012

MEETINGS

Washington Cranberry Winter Workshop: Saint Lawrence Catholic Church Hall, Raymond. Tuesday, January 31, 2012, 1:00 to 4:00 p.m. Three pesticide credits will be given. Aside from me, speakers will include Jack Perry, University of Wisconsin, who will talk about new pest management tools and methods used by Wisconsin growers; Kevin Talbot from Ocean Spray Inc; and Tom Hoffman of WSDA, Leigh Nelson of NRCS, and Troy Peterson of WSU, who will talk about irrigation and chemigation.

Oregon Cranberry Winter Workshop: The 2012 Oregon Cranberry School will be held on Thursday, February 2, 2012, at the Sprague Theater in Bandon, Oregon. For more information about the event, contact Linda White at 541-572- 5263 X285.

British Columbia Cranberry Congress: Tuesday, February 7th, 2012. Call the BC Cranberry Marketing Commission at 604-307-1046 for details. Speakers include Nick Vorsa, Sheila Fitzpatrick and John Wilson.

Northwest AG Show. January 24 to 26, 2012, Portland Expo Building. If you've never been, it is a great AG show. If you need pesticide credits, there is a Tuesday morning session in Room D201 that might be relevant. For more information, see http://www.nwagshow.com/seminars.php

Grayland Spring Workshop for 2 pesticide credits: North Cove Grange Hall, Wednesday, April 18, 2012. 6:00 to 8:00 p.m.

PEST MANAGEMENT

Pesticide storage: Winter is a good time to consider taking an inventory of all products and marking the date of purchase to help you rotate your stock. Also make sure you haven't stored respiratory and applicator safety equipment, fertilizer, animal feeds, seeds or baits in the same area with pesticides, that the exterior of the storage facility is clearly marked that pesticides are stored inside, that the storage unit is locked, and that you have some kitty litter or some other type of spill preparedness on-hand. Also, any material that is no longer registered for use on cranberries should be set aside for the next pesticide pickup date held by WSDA.

Finally you may want to consider giving away or exchanging those old sacks of various pesticides or fertilizers that you

bought but are no longer using to another grower.

New pesticides for 2012: Quinstar will have a Section 18 for yellow weed control in time for its actual use this season. Growers should be reminded that it will still have an MRL issue and therefore can't be used for export fruit. Ocean Spray growers will receive slightly less for fruits treated with this herbicide. The insecticide Altacor will also be available for this season's use, but it also has an MRL issue. A new fungicide which had been looking very good on fruit rot is expected to be registered, but might miss being registered in time by a month. I will provide more information when it comes out.

Pesticide choices: To help with your choices in 2012, I have selected the more commonly used products by class, as well as some of the newer chemistries, with some efficacy data on common pests and costs. Costs were last year's prices and at commonly used rates. They are meant to be used only as a guide. Efficacy is also just a guide. It will, of course, vary by timing, level of infestation, application uniformity, etc.

Also see the website for the WSU 2012 Cranberry Pest Management Guide pdf (cru.cahe.wsu.edu/CEPublications/eb0845e/eb0845e.pdf) and the websites for the PNW Weed, Insects and Disease Handbooks 2012.

http://insects.ippc.orst.edu/pnw/insects;

http://plant-disease.ippc.orst.edu;

http://weeds.ippc.orst.edu/pnw/weed

Table 1. Relative uses and cost of cranberry herbicides

Herbicide	Grasses	Lotus & clover	Rushes	Yellow weed	Sourgrass	Crop safety	~$/ac/ application
Callisto 8 oz	Fair, depends on size and species	Poor to fair, timing and species	Good	Suppression only	Poor	Good, but bleaching possible	$27
Curio ½ - 1 oz	Poor	Good	Poor	Good	Poor	Good, but use low rate when actively growing	$7-14
Quinclorac 8 oz	OK with some	Poor	Poor	Good, but takes 1 yr	Poor	Good	$13
Casoron 60 #/ac	Good for pre-emergent on annual grasses	Poor	Fair on annuals, depends on species	Good suppression, no permanent control	Good	Good, but long term use at high rates will weaken vines	$120
Volunteer 8 oz	Excellent	Poor	Poor	Poor	Poor	Good	$3
Stinger 8 oz	Poor	Good	Poor	Poor	Fair, dormant season only	Application after early bud elongation causes damage	$9

Table 2. Relative cost and uses of cranberry insecticides

Insecticide	Fireworm	Weevil	Tipworm	Girdler	Other important issues	~$/ac/ application
Orthene	Good	Knockdown	Good	Poor	Water, bees, phi	$6
Diazinon	Good	Poor	Good	Poor	Water, bees	$18
Lorsban	Good	Knockdown	Good	Poor	Water, bees	$9
Avaunt	Good	Good	Poor	Poor		$30
Assail	Good	Moderate	Fair	Poor		
Sevin	Fair	Poor	Poor	Poor	Water, bees, has use restriction for exported fruit.	$19
Intrepid	Good	Poor	Poor	Poor		$20
Actara	Poor	Moderate	Poor	Poor	Bees	
Admire	Poor	Fair (larvae)	Poor	Poor	Bees	
Belay	Poor	Fair (larvae)	Fair	Fair	Bees	
Success	Good	Poor	Poor	Poor		
Delegate	Good	Poor	Poor	Poor		$35

Table 3. Relative uses and costs of cranberry fungicides

Fungicide	Fruit rot	Cotton ball	Red leaf spot	Twig blight	Other issues	~$/ ac/ application
Abound	Good	Good	Good	Good	14 days holding water	$18
Bravo	Good	Poor	Good	Good	Requires 3 days holding water; CA plans to set tolerance limits for end products that could be problematic	$15
Manzate	Good	Poor	Good	Good	Reduces fruit color	$17
Indar	Good	Good	Good	Good		$25
Copper	Poor	Poor	Good	Poor		$16

Resistance management: Plant pathogens, weeds and insects have and are becoming resistant to several pesticides. This is not just an academic issue. As we shift our pest management chemistries away from the broad spectrum pesticides (like Bravo, Diazinon or Casoron) to chemistries with more specific modes of action (Abound, Avaunt, or Callisto) the likelihood of resistance is almost a certainty. For example, there are already instances of weed resistance to Callisto in the Midwest, or closer to home, tipworm resistance to Diazinon in BC. So what does this mean to our day to day cranberry pest management operations?

Hopefully it gets growers to at least be aware that resistance is possible when the same tool is being used over and over. If something isn't working when it always has in the past, then perhaps resistance is at play.

More importantly, growers should consider rotation of chemistries whenever possible. Rotation should be based on the mode of action classification which is listed on the label of all pesticides (IRAC, FRAC, and HRAC group for insecticides, fungicides and herbicides respectively). In other words, don't just use an FRAC 11 fungicide (Abound), but rotate with a FRAC M3 (Mancozeb), etc.

Table 4 provides a list of commonly used cranberry pesticides and their modes of action and their risks for resistance. The three chemistries we need to pay the most attention to are Abound, Callisto and Delegate. Make sure you don't just use these products exclusively. Let me know if you think you are seeing something that looks like resistance with Callisto.

Table 4. Mode of action classification and relative risk of developing resistance to various pesticides used in cranberry production

Fungicide	Herbicide	Insecticide
Abound – 11, high	Curio- B, moderate to high	Lorsban -1B,
Indar- 3, moderate	Casoron –L, low	Diazinon- 1B,
Mancozeb –M3, low	Callisto-F2, moderate to high	Assail - 4A,
Copper –M1, low	Select – A, moderate	Avaunt -22A,
Bravo – M5, low	Devrinol-K3, 15, low	Intrepid -18,
	Evital –F1, low	Success -5a,
	Stinger- O, low	Admire- 4A,
		Orthene -1,

Weed control for 2012:

Winter/early spring: Growers should consider Stinger for sourgrass, aka sheep sorrel, this winter. It takes several applications to achieve suppression. Follow the label for rates and warnings. Avoid applications after the bud begins to elongate (early to mid-April). Consider treating any lotus or clover in the beds at the same time. Growers with buttercup should treat with Curio in March or April. Curio will also do a decent job on lotus and clover at this time frame.

Spring/early summer: The relatively high cost of Casoron/ac compared to the three post-emergent broadleaf herbicides, Callisto, Curio and Quinstar, should have some growers on the margin rethinking their herbicide plans for 2012. Unless your beds are loaded with horsetail or really weedy, it might be more cost effective to consider using several post-emergent herbicides instead of Casoron. Callisto applied through the sprinklers at early post-emergence will provide decent control of numerous species of rushes, grasses and broadleaves.

For silverleaf, wait until the plant has had its first major growth flush before treating with Callisto. If yellow weed is bad enough that a grower is willing to take a slight reduction in price, he or she should treat with Quinstar in mid-May, and again after fruit set. An additional treatment with Curio mid-summer could be considered for better control

Other uses of Quinstar: Like all new tools, it takes a while to figure out the best fit in cranberry beds. Here are a few weeds that, if treated when small, are controlled or suppressed: annual grasses like barnyard grass, velvet grass, and foxtail; broadleaves like bedstraw, clovers, morning glory, marsh St John's wort; sowthistle, dandelion, catsear, and purple aster.

Other uses of Curio: Consider using Curio for control of clover, lotus, dandelion, beggarticks, smartweed, nutsedges, and St John's wort. Avoid the 1 oz. rate during active growth period.

Problematic weeds: We have nothing new or very exciting on the control front for sheep sorrel, false lily of the valley and arrowgrass.

Minimizing crop damage from herbicides: I get apprehensive about the use of any new herbicides and the potential for crop losses. We do a good job screening herbicides to make sure that when applied according to the label there will be minimal crop loss. However, when herbicides are applied as spot treatments with backpack sprayers, there is a good potential for rates to be higher than the label rate. This is especially true for products like Curio that are used at the 1 oz/ac rate. There is not much wiggle room before you are off-label. I've seen lots of tip damage from Curio in these circumstances. Quinstar seems to be fine and not have any phytotoxicity concerns.

Another concern I have is when growers tank mix several herbicides. We don't have enough data on how these combinations interact to improve weed control or result in crop damage.

Our research trials in 2011 suggest that some combinations don't provide any advantage for control while others might. I would strongly suggest that if anyone is going to use Curio + Callisto that the Curio should be at the ½ oz/ac rate and Callisto at 4 to 6 oz/ac rate. Finally, the application of any herbicide applied when cranberries are rapidly growing and have tender new leaves is likely going to be a concern. I would avoid these windows with Curio if possible or use a half rate.

Insect control for 2012

Girdler: Belay has been recently registered and could provide some control of larvae, but don't get your hopes up. At the current labeled rate and with our organic soils, efficacy is likely to be marginal.

Weevil: Avaunt applied to control newly emerged adults in June and July is still working well. We have no data; however, on how well it might work for the treatment of over-wintering adults in May. I suspect marginal efficacy. To help suppress weevil in problem beds, consider the use of Admire, Belay or nematodes as a larvicide in August.

Fireworm: Our 2011 data of numerous whole-farms/beds treated only with reduced risk insecticides like Delegate and Intrepid indicate that excellent control is feasible. Costs were comparable to conventional pesticides if Intrepid was used. It remains to be seen if this buildup of beneficial insects on these sites and lack of negative impacts to pollinators could have net positive impacts on farm production over time.

Growers interested in moving in this direction of pest management should be mindful that success is contingent on proper timing and more rigorous sampling for larval stage of development and abundance.

Disease control for 2012:

Fruit rot: Abound + Indar treatments mid-bloom continue to show promise for reducing fruit rot and increasing yield. Our 2010 and 2011 data suggest that their use more than compensates for their added cost.

When we looked at the total yield of sound berries on beds across four farms for two years, there was a net increase in grower returns of ~ $17,000 or ~ $2000/ac/yr. See Table 5 for further details on yields.

Table 5. Mid-bloom fungicide effects on yield of sound fruit and net grower returns in 2010 and 2011 (Experiments 1+2).

	Yield of sound (non- rotten) berries (bbl/ac)								
	Farm 1		Farm 2		Farm 3		Farm 4		Net grower $ returns (sum of all beds both years)
Treatment	2010	2011	2010	2011	2010	2011	2010	2011	
Bravo @ set + Manzate 2 wks post- set	85	184	70	110	187	312	145	230	$83,093
Abound + Indar @ 50 % out of bloom + repeat in 7 days + Bravo @ set + Manzate 2 wks post set	108	224	102	119	229	352	151	320	$100,215
Net return is the sum across all farms for both years @ $63/bbl , less fungicide cost (Abound + Indar twice @ $86/ac; Bravo followed by Manzate @ $32/ac)									

FARM MANAGEMENT

Wireless sensors for use on cranberry farms: Technology is moving quickly in this area. Systems are now available that easily allow you to view and control your irrigation system from your smart phone. You can have all your frost/heat sensors, soil moisture sensors, and pump/irrigation line pressure sensors send wireless data to your phone and/or home computer. You can also have wireless remote temperature or soil moisture sensors automatically turn on and off your pumps.

These systems are becoming more commonplace on both small and large cranberry farms in North America, and are no longer just for the large high-producing farms. There are distinct advantages to these systems that more than compensate for their cost. Having your phone wake you at 3 a.m. telling you to get up and check why your pump didn't go on when it is 31° F is priceless.

In general, we have found the Hobo system to be the least turnkey, requiring a reasonable amount of know–how to make it work. The Hortau system gets praises from some Wisconsin and Quebec growers, but is a little pricey for smaller Washington growers. The KC system is very easy to use, and is being used by numerous Massachusetts growers and a few Oregon and Washington growers. Also, more and more data are now available that indicate how really good cranberry production is closely linked to hitting the sweet spot in

soil moisture that can only be assessed with good soil moisture sensors.

There are not enough systems online on the West Coast yet to get good grower feedback on what is or isn't working. We have tested and played with a few of these and I've seen a few other systems working in other areas to at least get a preliminary assessment.

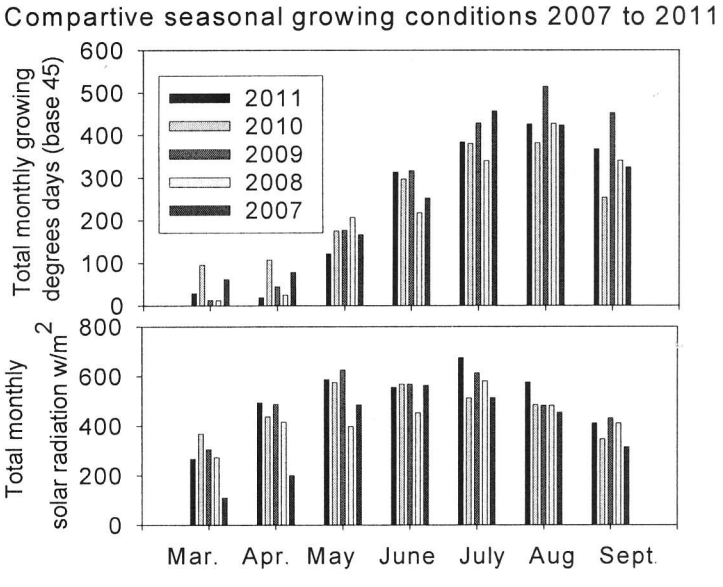
Table 6 lists a few of the most commonly used systems with their options and costs. Each system has pros and cons. Questions growers should think about include ease of hookup and operation, ongoing cost, compatibility with local cell providers, line-of-sight reception, product support and add-ons, type of alert options, and total cost. Email me if you want more information.

Table 6. Comparisons of commercially available wireless temperature/soil moisture monitoring systems used in cranberry beds.

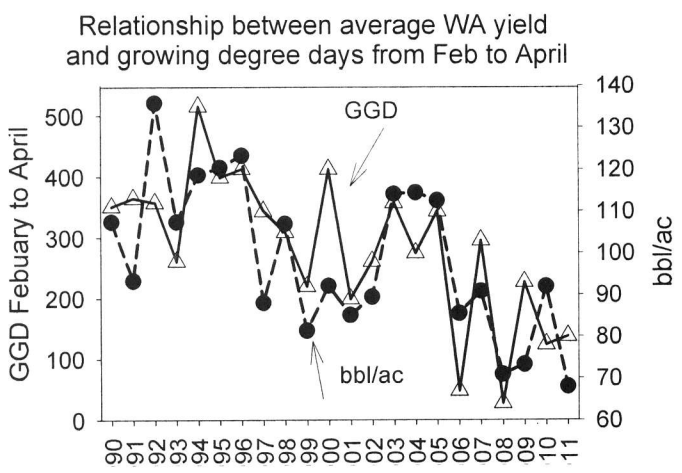
System	Basic system	Add-ons	~Costs
Hobo http://www.onsetcomp.com	Sensor + receiver, sensor can be temperature or soil moisture, needs nearby computer as receiver.	Additional add-on sensors and repeater for longer reach. Weather station, auto start & pump controller	Basic unit ~$500 w/ no subscription cost Add-ons~ $500+ Auto-start unit~$2000 w/ web access.
KC Systems http://www.iassys.com/	2 sensors (soil moisture or temp or pressure)	Auto start, additional sensor and controllers	Basic unit ~$1000 w/ $25/mn data plan, Auto-start unit~$5000
Hortau http://www.hortau.com/en/home/	2 sensors (soil moisture and temperature)	Auto start, additional sensor and controllers	Basic unit $12,000 w/ $100/mn data plan

2011 Crop: 2011 was another less than remarkable year for yield in the PNW. Most growers, but not all, were down from their average and some even down from last year's record lows. There are lots of speculations as to the cause, the most obvious of which was our very cool spring and early summer. I've also heard growers remark on problems with winter and frost damage, vine overgrowth, heat damage, low native bee numbers, and fireworm damage.

Comparison of seasonal growing conditions during the past 5 years is shown in Figure 1. From the solar radiation perspective, 2011 was an average year. Growing degree days from June to September were near normal, but there were a low number of growing degree days in April and May. This resulted in a very late bloom and from there it is hard to catch up.



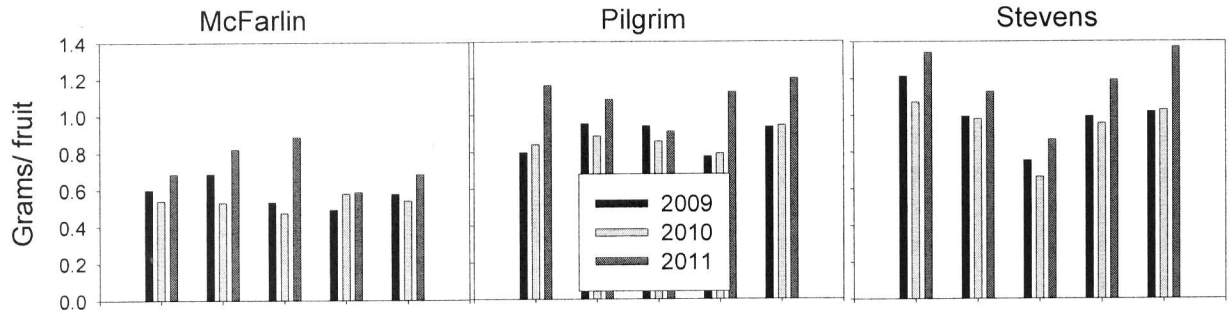
If you recall, in a December 2008 newsletter, I compared yield over time to various weather factors and showed that years with low total GDD from February to April resulted in poor yield. That figure is shown again with 2009 to 2011 data added in. It is not a perfect relationship, but it falls within the trend. What I find most interesting is that some growers were able to buck the trend in weather and do just fine in 2011.



Another issue related to weather is its effects on fruit size. We have been collecting fruit size data for several years off the same beds every 14 days starting August 26th. In the figure below the three grouped bars are fruit sizes off the same locations/ beds and farms for 2009, 2010 and 2011. Three things stand out. First is that relative fruit size for each bed doesn't change much across years. The same beds always have the biggest or smallest fruit on any given year. Second, size in late August is directly related to the final size at harvest from any given bed (data not shown). Third, fruit size is most driven by temperature during fruit set. Warmer weather during this time results in a greater number of cell divisions which in turn allow fruit to ultimately get bigger during the growing season.

The weather is also indirectly tied into other variables affecting yield. With the fireworm hatch being several weeks late, I know several growers missed their spray timing and had some pretty serious losses as a result. There is nothing better than in-field sweeping for first generation to perfect your timing. It is easy, fast and it doesn't result in crop damage. Without this sort of data it is like swinging a bat at a baseball with a blindfold on. Another indirect effect of weather on yield is that during the cool seasons/low crop years there is a tendency for growers to over-apply nitrogen and get overgrowth. This compounds their yield problems.

If we continue to have these La Niña weather conditions, there is little one can do to mitigate for the expected crop declines other than that optimizing your varieties in the future. The better selections seem to be more stable under adverse weather. See Table 7 comparing yields of different varieties from 2006 to 2011.



Difference in fruit size picked from the same beds on August 26 in 2009, 2010 and 2011.
(5 beds/farm for each variety)

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Table 7. Yield from cultivar trials in Long Beach WA. Planted in 2003							
	Yield bbl/ac						
Variety	2006	2007	2008	2009	2010	2011	Total
Crimson Queen	179	347	242	293	208	194	1361
Mullica Queen	20	252	178	206	224	147	966
Scarlet Knight	181	182	173	247	267	147	1198
Willapa Red	217	383	229	376	232	246	1628
Pilgrim	202	327	345	334	319	291	1758
Stevens	48	209	138	246	168	159	929

WEATHER HISTORY – WSU Long Beach Research and Extension Unit

Precipitation (inches per month)							Monthly Growing Degree Days (based 45°)				
Month	**2008**	**2009**	**2010**	**2011**	**20 year average**		**2008**	**2009**	**2010**	**2011**	**20 year average**
January	10.5	10.8	13.2	13.2	12.2		4	23	83	28	48
February	5.4	3.7	8.2	7.8	7.4		16	20	56	4	41
March	9.7	7.7	9.5	10.6	8.6		12	10	72	22	68
April	5.3	4.2	7.9	8.4	6.4		43	61	92	29	114
May	2.5	4.8	3.9	4.8	3.7		230	214	180	158	244
June	2.4	0.7	4.9	1.9	2.9		244	361	290	323	340
July	0.5	0.8	0.9	2.3	1.2		364	427	377	414	443
August	4.0	1.6	1.5	0.4	1.6		425	463	411	453	454
September	0.9	3.3	5.6	3.3	2.5		326	401	382	370	371
October	4.9	8.2	7.8	5.4	7.2		166	184	220	205	216
November	11.1	20.3	13.2	10.4	12.1		138	71	85	28	82
December	11.3	6.2	14.7	4.6	12.3		16	27	35	9	31
Totals	**68.5**	**71.0**	**91.4**	**72.2**	**78.1**		**1984**	**2263**	**2283**	**2043**	**2452**

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