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CRANBERRY VINE

WSU Long Beach Research and Extension Unit
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November 2013

Meetings

Washington Cranberry Winter Workshop: Saint Lawrence Catholic Church, Raymond, Tuesday, January 21, 2014, 9:00 a.m. to 1:00 p.m. Pesticide credits will be given. Aside from me, speakers will include Dr. Carolyn DeMoranville from the University of Massachusetts, Kevin Talbot of Ocean Spray and folks from the NRCS and WSDA. Dr. DeMoranville will present highlights of over 30 years of her cranberry nutrition research. Please note the change in the day and time of day. I had to change in order to accommodate our out-of-state speaker.

Oregon Cranberry Winter Workshop: The 2014 Oregon Cranberry School will be held on Wednesday, January 22, 2014, at the Sprague Theater in Bandon, Oregon. This year's school will include presentations from Dr. Carolyn DeMoranville.

The cost will be $5 for OCGA members and $75 for non-members. For more information about the event, contact Bob Donaldson at (541) 348-2242.

British Columbia Cranberry Congress: This year's Congress is scheduled for Tuesday, February 4th, 2014 at Mayfair Lakes Golf and Country Club. Call the BC Cranberry Marketing Commission at 604-307-1046 for details.

Northwest AG Show: January 28 to 30, 2014, Portland Expo Building. This is a great AG show. If you need pesticide credits, there are some programs available for credit.

Grayland Spring Workshop for Pesticide Credit: North Cove Grange Hall, Wednesday, 7:00 to 9:00 p.m., April 16, 2014.

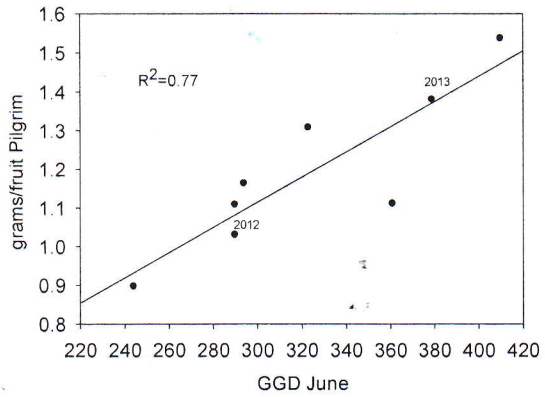
2013 Crop

Overall, it was a good year for the Long Beach area, but not the Grayland region. Why the difference? Perhaps all the recently renovated beds in Long Beach made a difference to the area's average. Some varieties and beds did quite well; others did not. Grygleski #1 and true Pilgrim beds on average did well; McFarlin and Stevens were mixed. Crimson Queen was down from last year.

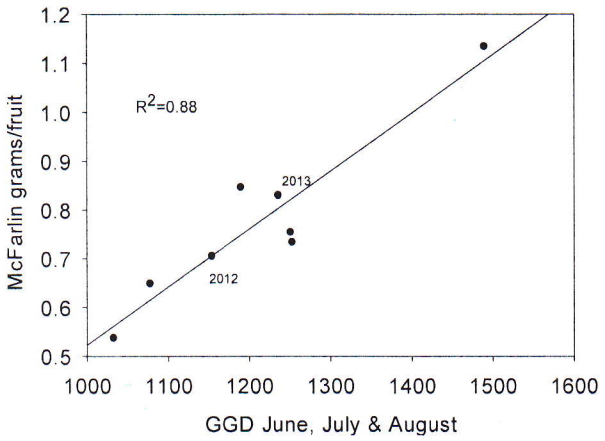
I heard complaints about small fruit, tipworm, over-growth, keeping quality, and frost damage affecting the crop. Small fruit and tipworm-caused crop loss appeared to be the major concerns.

Fruit size is very strongly tied to weather and genetics. Below are two graphs that show fruit size on September 8th over 8 years as a function of growing degree days. The first graph is Pilgrim fruit size vs. GGD in June. Basically ¾ of the variation in Pilgrim size at the end of summer is all based on how warm June is. Warm June = decent size Pilgrim.

It is not that the rest of the summer is not important, but, for this variety, June weather is the main determinant of size.



For McFarlin, however, the relationship between size and June weather is weak. Instead, GGD for the entire summer are a better predictor, accounting for 88% of the variability in size. I have data for Stevens also, but it is less clear.



What is going on? Fruit size in cranberries is like most other fruit and final size is a function of the number of cells and cell size. Cell number is determined by the number of cell divisions very early in the life of a newly fertilized fruit. Warm weather during this time period results in more cell division and greater capacity for larger fruit later in the season.

Interestingly enough, based on 5 years of measuring size increase on the same beds from the end of August to the end of September, the increase in fruit size is very constant between beds and years. The mean weekly weight gain between August 26th and September 23rd for McFarlin, Pilgrim, Stevens, and Crimson Queen was 0.042, 0.063, 0.043 and 0.056 g/fruit, respectively. The 2013 growth rate was almost identical to that of 2012. After September 23rd, fruit growth rate usually levels off, but this varies a lot by bed. Based on measuring this same pattern across numerous growers and varieties over the past 6 years, my take on fruit size is that outside of genetics, weather, and keeping your beds healthy, there is not much you can do to affect the final size.

The extensive crop loss caused by tipworm on beds, mostly located in Grayland, is troublesome. We have had plots with tipworm in Grayland since 2000, but it has only been a very minor pest, causing minimal crop loss. One or all of the following could be responsible: 1) the insect has developed resistance to diazinon, as has been reported in BC; 2) the transition away from OPs to reduced risk insecticides, like Intrepid, has caused the populations to build up, and/or 3) the population finally reached a critical mass that allowed for it to explode over a wider area. See below for control suggestions in 2014.

Pest Management

Fruit Rot: Dr. Frank Caruso, retired from U. Mass and now living in Washington, has been looking at 2013 fruit samples from Long Beach and Grayland beds to determine our field and storage rot organisms. The data is still very preliminary, but field rot seems to be coming from *Allantophomopsis, Colletotrichum* and *Physalospora*. A lot more information on this project and what it means to growers will be provided at the winter workshop.

Tobacco Streak Virus (TSV): This disease is a virus which is causing berry scarring and possibly blossom blast and tip dieback in cranberries on some Wisconsin cranberry beds. It is currently believed that TSV is transferred from infected to uninfected plants by thrips transferring TSV-infected pollen.

Since thrips are not a concern on west coast cranberries, it is not likely that TSV will be a major concern for us. We don't know enough about this disease, however, to toss caution aside. For Washington beds it could possibly be could be transferred by the common spittlebug (*Philaenus spumarius*). Growers getting vines from Wisconsin should proceed with caution and make sure they come from TSV-free beds. For more information on TSV and to see what infested fruit look like, refer to http://wood.uwex.edu/files/2013/08/13AUG9-Individual.pdf.

Winter weed control: For sheep sorrel, lotus and clover control, try a winter Stinger application. It is reasonably effective and there is no risk to the crop if you use label rates and don't apply after February. Sheep sorrel takes several repeat applications. Similar results can be achieved for winter biennials (dandelion, catsear), lotus and clover using winter Stinger. This assumes the weed canopy is still green. For buttercup and tussock use Curio. Winter grasses (annual bluegrass, sweet vernal, bentgrass) can be suppressed or controlled with repeated applications of Select. This assumes that the grass is showing green tissue at the time of application. In a delayed dormant season, Curio + Callisto can be used to suppress/control cutgrass and sedges.

Flaming for weed control: Studies by Dr. Sandler's team from UMass indicate that a hand-held flame torch held over dewberry crowns for 9 seconds provides reasonable control. Two applications during the season were better than one. Cranberry vines recovered over time. Blackberries, both upright and trailing, can be problematic in the PNW. These studies were done during the growing season. I am not sure how it would work as a dormant season treatment, but might be something to play with if you have bramble issues, especially if you are considering an organic approach. Callisto, by itself, provides useful suppression of brambles, but must be repeated over the years to get actual control.

Twig Blight Control: The low price of cranberries on the independent market is going to force some growers to minimize expenditures on fungicides. On some farms this can be done without too much consequence. On farms with a history of twig blight infestation this could be a disaster. To save money and still get twig blight control, use two fungicide applications, with one being an inexpensive off-brand chlorothalonil and the other Manzate.

Tipworm: If our tipworm populations are resistant to diazinon, then we have few effective insecticide options. Orthene and Lorsban have PHI and export issues, and none of the new reduced risk insecticides is very effective. Sevin is reported by growers in BC to provide some control. The new tipworm insecticide chemistry that we have been evaluating for the past 6 years is very effective; however, its registration has been delayed for a year (or maybe even longer) by EPA. If there are not MRL concerns in 2014, consider using Sevin. Note that there are pollinator restrictions. Also check with your handler, as there are some markets, like California, which have excluded fruit treated with Sevin.

Even with a good insecticide, control is still problematic. Timing a spray for egg laying/hatch is critical for efficacy, but is much easier said than done. They are too small to easily detect, and by the second or third generation the hatch begins to be asynchronous. If you are lucky, timing of the first generation tipworm spray will coincide with your first fireworm spray(s). Second and third generations are much more scattered. Examining tips for eggs and brand new larvae using a hand lens is recommended. A mating pheromone has been developed for monitoring but is too expensive to be commercially produced. We are hoping that a new emergence trap, developed in Quebec by

Annabelle Firlej, will be useful. We will evaluate it in 2014.

Fireworm Control: Our 2013 fireworm control studies with Altacor and Intrepid were nothing short of spectacular. The long-term residual control that they offer, up to 3 weeks with Altacor, makes timing of 1st and 2nd generation sprays less critical. I strongly advocate for them as superior replacements chemistries to OPs.

For the organic farmers struggling with fireworm, a short spring flood with water above the uprights for 24 to 48 hours just at egg hatch looked very promising for reducing 1st generation populations. At NACREW 2013, there was an interesting report from Quebec on the efficacy of various organic insecticides for fireworm. They compared Entrust, Pyganic, BT, and azadirachtine for different sizes (instars) of larvae. Basically, efficacy declined at later instars, and Entrust and Pyganic were the only two products that worked for the larger instar larvae. Nevertheless, there was still ~10% fruit damage with the best Entrust treatments.

Another interesting tidbit for organic farmers using short-residual chemistries like Pyganic is that research is suggesting efficacy is enhanced on some insects if applications are made when the insects are at a low spot on their circadian rhythm at ~ 6 am.

Cranberry Management

Pollination: Honey Bee Colony Collapse and decline of native pollinators continue to be major concerns for agricultural crops requiring pollination. I came across four new studies in the area that are relevant to the cranberry industry. Dr. Ann Averill, UMass, has found that bumble bees are collecting imidacloprid, the chemistry implemented in colony collapse, from cranberries in the year following treatment. Similarly, Dan Schiffihauer from New Jersey found the same thing with honey bees. This suggests residual impacts of using long-lasting systemic insecticide on pollinators. Growers should be very cautious about their use of insecticides like Admire or Belay in or around cranberries.

In another recent study that made front page headlines, a USDA researcher examined honey bees used for pollinating crops on the east coast, including blueberry and cranberry. They found significant increases in the susceptibility to the gut pathogen *Nosema ceranae* parasite following exposure to the fungicides in crop pollen, especial chlorothalonil. They suggest that some fungicides could have stronger impacts on bee health than previously thought. They also found pollen samples that contained as many as 21 different pesticides. They suggest that simultaneous exposure to multiple pesticides decrease lethal doses or increased supersedure (queen replacement) rate.

Lastly, a study presented to NACREW by Dr. Chagnon, University of Quebec at Montreal, examined the impacts of different insecticides on cranberries during bloom. They followed bee behavior and mortality over time following insecticide treatments. This was done by using 4 frame hives enclosed within large screen cages on the treated cranberry beds. They found that even relatively benign chemistries like Entrust killed bees, even if it was rinsed off one hour after.

I mention these studies for several reasons. 1) The use of recently registered neonicotenoid insecticides, as well as the pending new registrations, are all in jeopardy. Because of the residual effects, they should only be used on a minimal basis. A promising new control for tipworm for example, may never come to pass because it is a neonicotenoid. 2) Although there are currently no restrictions on fungicide use during bloom, that policy will come under closer scrutiny. Expect to hear more about this in the future. 3) The practice of applying

insecticides at night and then washing them off in the morning to minimize their impact to bees is questionable. Based on Dr. Chagnon's study, and the work we did in the 1990's with diazinon, this is not a prudent recommendation. Our work suggested that the diazinon was reactivated when wet and resulted in mortality of honeybees. I never suspected that that would also be true for some for the compounds that have much lower toxicity, like Entrust.

Problems irrigating with shallow weed-infested water? I came a across an interesting product that might provide a solution. See http://www.riverscreen.com . I am not endorsing it, but thought it was intriguing.

Recommendations for cranberry varieties for renovated beds: With a long-term oversupply of cranberries on the horizon, growers may question the sanity of spending a lot of money on renovations. From my perspective there are four options: 1) leave well enough alone and don't renovate, 2) renovate with the least expensive, most productive variety, 3) renovate with a variety that targets a market niche that is not in oversupply (such as fresh fruit) and 4) renovate with the most productive variety available.

Obviously, your choice depends on your current financial situation, your handler's long-term projected grower returns, and numerous other variables. I won't comment on option 1, other than to say that proactive growers realize that to stay in business for the long term they will need production levels that are competitive with other growing regions. This is hard to do in Washington without the better varieties.

To renovate with the least expensive, most productive variety, growers have to avoid any of the newer patented selections from Rutgers or the University of Wisconsin. They also need to avoid the very costly mistake of planting off-types. "True" Pilgrim and Stevens have a good track record that is hard to argue with. True Stevens are available, while it may be much more difficult to obtain true Pilgrim.

I will spare you my normal rants about the importance of DNA testing for these two selections. Other options are Grygleski #1, Willapa Red and Yellow River. Grygleski #1 are a great fresh market fruit, and have also had good consistent yields for the processed market. There is no evidence of off-types of Grygleski #1, but I would still avoid getting vines from prunings. I would also avoid Grygleski #2 and #3, as they are as not as productive as #1. Some Wisconsin beds are having die-back problems with Grygleski #1's.

Other considerations for non-patented selections include Willapa Red and Yellow River. Willapa Red has had good production in all the variety trials, but its availability is still problematic. Its potential for the fresh fruit market is being evaluated by some growers. It is a tough vine that does well under wetter conditions, and its small fruit make it less subject to mechanical damage when dry picked. Yellow River is an Oregon grower favorite that resembles Stevens. Early results from variety trials in Oregon and Washington suggest that its production is on par with Stevens but nothing special.

Varieties for the fresh fruit niche include Grygleski #1, Scarlet Knight and HyRed. They all color early and fit the early harvest window. Scarlet Knight, while having off-the charts TACY readings, has not been the best producer on the West Coast. We have limited west coast comparative data on HyRed and its newly released sister Sundance. The patent holders have been unwilling to put in variety trials with other new releases. Nevertheless, HyRed has looked promising in the growers' beds in BC and Oregon.

Sundance is untested in the West and might be too big a fruit for dry harvesting. A few Sundance plantings will be planted in Oregon

and Washington in 2014 and bear close watching. We (Rutgers and WSU) are assessing several new selections for late harvest Christmas market fresh fruit, but it will be years before we have recommendations.

To renovate with the most productive variety available, growers should consider some of the new Rutgers selections. By now most growers are familiar with Crimson Queen and Mullica Queen. They have been out long enough for growers to get a sense of their production potential.

One problem that has been noticed with Crimson Queen is that they don't hold up too well in late harvest. The fruit tends to break down and leak, causing handler issues. This might also be true of some of the other early maturing varieties. Therefore, if you have any of these selections aim for the early harvest, and don't plant them in areas of the farm that are last on the harvest sequence.

DeMoranville is a more recent Rutgers release and consequently did not get in the first wave of grower plantings. It is the best tasting cranberry available, and in my opinion a better selection than the other named Rutgers releases. Its growth pattern, quick to fill in and with minimal runners and medium fruit size, might make it a good selection for fresh fruit. BG is Ed Grygleski's most recent release. It is a beautiful large fruit that looks good so far in our trials, but I am unable to make any recommendations at this point.

Lastly two new un-named releases from Rutgers are becoming available. Until they are formally named, they are being called Rutgers 1 and 2. They are by far the most productive varieties on the market. They have good color and size, but can suffer from fruit rot if not treated with fungicide. Contact Integrity Propagation for more information on these two selections. How much more productive they are than other new releases remains to be determined over time on grower beds. Based on replicated variety trials in Oregon and Washington, however, they are very impressive.

The table below indicates their production potential in comparison with the other industry standards. If we extrapolate this to potential net returns after vine costs are considered, they more than compensate for the extra expense.

Oregon Variety Trial yield (bbl/ac) data from 2009 planting*

Variety	2011	2012	2013	Total bbl/ac 2011 to 2013
Rutgers 1	560	725	500	1785
Rutgers 2	448	568	385	1401
DeMoranville	72	559	400	1031
Crimson Queen	46	553	375	974
Pilgrim	59	398	510	967
Willapa Red	110	469	380	959
Mullica Queen	44	551	355	950
Grygleski 1	35	254	375	664
Scarlet Knight	39	304	315	658
Stevens	31	216	315	562
Yellow River	69	188	300	557

* Plots were picked for yield at locations within the plots that represented that plot's highest yield potential.

As an aside note on Stevens beds purity, there was an interesting talk at the 2013 NACREW conference by Simon Bonin. He used fruit shape as a comparative marker for Stevens purity and compared it to DNA on 500 different beds in Quebec. He found a good correlation between beds with fruit that have a high percentage of Stevens-shaped fruit and beds with Stevens DNA. In addition, they compared average 4 year yield as a function of % purity. Yield decreased 40% and 25%, with a purity of <60% and <80%, respectively. If you have Stevens or plan on planting Stevens, and don't want to pay for DNA analysis, take a close look at the fruit. If there is a high

percentage that doesn't have the characteristic Stevens shape, then vine purity is likely an issue.

How Much to Prune? If you over-fertilized this summer and have a jungle of runners, you are going to have to clean up the mess with some significant pruning. However, pruning is not a panacea, and growers can reduce next year's yields with over-pruning. Each variety and bed will respond somewhat differently. I recommend that you consider leaving a swath or two unpruned or lightly pruned this winter across several beds. Makes notes and observe how those sections compare for yield in 2014.

Frost protection for spring 2014: A few reminders for next year. Sensor location is critical. As I mentioned in the last newsletter, PCCRF got frosted out in 2013, because of pump failure. The only locations with any significant fruit were in areas next to bare sand. Due to more ground heating, these areas are warmer than heavily vined and/or peaty locations. A sensor placed on the edge of the beds in thin vines, or bare soil will likely be several degrees warmer than the rest of your beds. The same holds true for shielded sensors or one that is elevated a foot off the vines. New data from Dr. Peter Jeranyama's lab at UMass showed that intermittent irrigation cycling for frost protection didn't provide as good protection as continued irrigation. He found 5% more damaged floral meristems with intermittent irrigation than conventional frost protection. This level of loss was not, however, significant enough to result in fruit yield loss.

Drainage: Spots which are slow to fill in are maybe too wet. Consider additional drainage tile this winter. Some growers report that a top-dressing of sawdust has really helped fill spots suffering from wet feet.

PESTICIDE NEWS FOR 2014

Product guides: There are several ways to make sure you are up to date on pest and pesticide information for 2014.

1) 2014 NW US cranberry pesticide chart mailed to each grower by the Cranberry Institute. If you don't get this, contact the CI.

2) All 2014 pesticide label information for cranberries in Oregon and Washington can be found on WSU's PICOL website. To find out what is legal to use, go to http://picol.cahe.wsu.edu/LabelTolerance.html.

3) 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 2014 version is already out and can be found at http://cru.cahe.wsu.edu/CEPublications/eb0845e/eb0845e.pdf.

4) 2014 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. They can be downloaded as PDF files. They are annually updated handbooks. See http://insects.ippc.orst.edu/pnw/insects; http://plant-disease.ippc.orst.edu; http://weeds.ippc.orst.edu/pnw/weeds

5) Other state pest management quidebooks. The University of Massachusetts, University of Wisconsin, and Rutgers all provide excellent annual pest management guides and are available on-line. Be cognizant that recommended timings/rates etc. may not be valid for our conditions.

http://www.umass.edu/cranberry/pubs/chart_book.html
http://njaes.rutgers.edu/pubs/publication.asp?pid=E308
http://learningstore.uwex.edu/Assets/pdfs/A3276.pdf

Insecticides: EPA is likely to remove the cranberry label from Assail in 2014 due to water issues. Since it also has issues with MRLs and is only a moderately effective insecticide, Assail should not be purchased for 2014 use.

Pesticides with "Restrictive Use" labels in Grayland: Diazinon and Lorsban are currently Restrictive Use insecticides for the Grayland growing area due to water quality concerns. Growers cannot use these products unless their ditches are completely covered and there is no surface water exposed during chemigation.

New registrations: There is a new fungicide from Certis with a cranberry label. There are reports that Tavano has provided good cranberry fruit rot control in New Jersey. It might have potential for twig blight control. See website at http://www.certisusa.com/pdf-labels/tavano_label.pdf. I don't know if there are export restrictions with it. Certis also has DoubleNickel, an organic fungicide with a cranberry label. I am not sure of its efficacy. Another new, very effective fungicide is also likely going to be registered for the 2014 season. At this point in time, however, it still has MRL issues and would likely be excluded from export fruit. No new insecticides or herbicides are pending for the 2014 growing season.

Waste Pesticide removal: WSDA had a very successful waste pesticide removal program with well over 10 tons being disposed. I've heard that a few growers still have product that they need to remove. Contact WSDA at (360) 902-2056 for the next opportunity, or visit their website at www.agr.wa.gov/wastepesticide or email WastePesticide@agr.wa.gov . The issue of waste pesticide removal is very important for any grower seeking to obtain GAP certification. You won't pass inspection unless these products have been removed from your farm.

Spray equipment winter maintenance: This is a good winter project. Use a household detergent, ammonia or commercial tank cleaner to remove pesticide residue from your tank and booms. See label for recommendations for each product. First, do a good water rinse, followed by several rinses with a cleaner in the tank/sprayer/boom, then another water rinse. Remove and clean all filters, nozzles, nozzle screens, and end caps. Lubricate o-rings with vegetable oil.

If you are in a region that gets cold, winterizing your clean equipment is important. Use an automotive antifreeze for protection of lines/pumps and/or air compression to remove all liquid. Use lithium grease on solenoid switches, and vegetable oil on metal screens and fittings to prevent rust. Repair worn/broken parts as needed. For more information, see http://techlinenews.com/articles/2012/12/30/cleaning-and-winterizing-herbicide-sprayers.

Pesticide shed maintenance: Update your personal protective equipment with new filters for your mask, gloves, eye protections, chemical-resistant aprons etc. Organize your pesticides, and do an inventory and make sure every product is dated. Consider double containment for anything that is in a metal container, especially if it is old. Products no longer labeled on cranberries and not useable elsewhere on the farm should be disposed of (Call WSDA). Make sure you have ample kitty litter and other items needed to deal with a spill. Some liquid products that are subject to freeze damage will need to be protected if it gets really cold. Freezing can cause some liquid pesticide/surfactants to come out of their emulsions and no longer be useable.

Pesticide residues: The concern about pesticides on cranberries exceeding the MRL residue level for the EU or US is why the industry is so proactive in protective screening. We did a study this summer looking at residues of new upcoming registrations. We also tossed in some standard pesticides since the cost is the same. Conducting these studies in WA is ideal because our low light intensity means photodegration of residues is a lot lower than other areas, so the results are worst case scenario.

Table 1 provides the results for some common cranberry pesticides. The study was designed

Table 1. Effect of spray dates on the residue of various cranberry pesticides									
		# of days sprayed from harvest date			ppm detected in fruit				
Trade Name	PHI	PHI	PHI+	PHI++	PHI date	PHI date+	PHI date ++	US MRL	EU MRL
Orthene	75	77	91	112	**0.04**	**0.04**	<0.01	0.5	0.02
Assail	1	3	4	6	0.02	<0.01	<0.01	0.6	2
Sevin XLR	7	6	10	12	0.15	0.12	0.13	3	
Altacor	1	3	4	6	0.03	0.04	0.04	1	1
Bravo	50	52	61	77	**9.30**	**8.47**	**2.40**	5	2
Lorsban	60	61	77	91	**0.35**	**0.16**	**0.04**	1	0.05
Belay	21	24	27	34	<0.01	<0.01	<0.01	0.01	0.02
Diazinon x	7	7	10	13	<0.01	**0.17**	**0.16**	0.5	0.2
Venom	1	3	4	6	0.01	<0.01	<0.01	0.2	
Indar 2 F	30	31	39	47	0.03	0.02	0.03	0.5	1
Admire 2 F	30	31	39	47	**0.08**	**0.04**	**0.05**	0.05	0.05
Avaunt	30	31	39	47	0.11	0.09	0.09	0.9	1
Imidan	10	12	17	24	0.02	0.01	0.02	0.5	0.7
Intrepid	14	17	18	21	0.17	0.23	0.26	10	10
Orbit	45	47	55	70	0.02	<0.02	<0.02	1	0.05
Delegate	21	24	27	34	<0.01	<0.01	<0.01	0.04	0.05
Confirm	30	31	39	47	0.08	0.02	0.08	1	0.5
Actara	30	31	39	47	<0.01	<0.01	<0.01	0.02	0.05
Numbers in bold are above or very close to US or EU MRL values for residue									

to apply the product on its PHI date or on two other dates prior to the PHI day. For example, if the PHI was 77 days (Orthene) then we sprayed replicated plots on day 77, and another series of replicated plots were sprayed on day 91 (PHI +) or day 112 (PHI ++). This allowed us to see how much wiggle room there is with the PHI. I've bolded the numbers that were above or close to the EU MRL or US tolerance. Most pesticides are non-detectable (<0.01) or well below the MRLs. A few, however, stand out as problematic.

Orthene was above the EU MRL at 77 and 91 days before harvest. Bravo was above the US and EU at 52 and 61 days, and above the EU MRL at 91 days. Diazinon was close to the EU MRL at 10 and 13 days. Admire (imidacloprid) was at the EU MRL at 47 days.

What effect does delaying harvest have on troublesome residue? We resampled the fruit from the set of plots sprayed on their PHI after an additional two weeks in the field. In other words, we waited 2 weeks to see if the residue would go below the MRL. Table 2 shows that for the chemistries with problems, their residues all remained above the MRL threshold.

Table 2. Effectiveness of delaying harvest on residue reduction			
Trade Name	Spray date	ppm detected in fruit	
		picked 10/1	picked 10/15
Orthene	15-Jul	**0.04**	**0.03**
Bravo	9-Aug	**9.3**	**4.5**
Lorsban	30-Jul	**0.35**	**0.16**
Admire 2 F	30-Aug	**0.08**	**0.17**
Numbers in bold are above EU MRLs			

So what does all this mean? The low EU MRLs for Orthene and Lorsban make these compounds too risky for use on export fruit. Bravo and Admire exceeded the US MRL

when applied at the PHI date. Use of these pesticides as per the label PHI could be problematic. Back well off the PHI of Bravo if you are going to use it. Also since this study only used a single application of products, there may be additional concerns on compounds that have multiple applications.

If your preharvest screening comes up with an above MRL residue, don't expect that a two-week delay in harvest is going to help you much. Lastly, should you need a last-minute insecticide application, consider using Altacor. It has a 1 Day PHI, and we found residue levels at an order of magnitude residue below the MRL. If any handler is interested in the full data set, please let me know.

WEATHER

Weather 2013: Nothing too noteworthy this year. Overall, it was a year with below average growing degree days and average rainfall. The exception was the warm and wet September and dry October. A WSU AGWeathernet Station planned for Grayland is moving forward. We hope to get it on ground and operating by spring 2014. More on this at a later date.

One last word on weather - with the current and projected long-term weather patterns for the west coast, it will be difficult for Washington, Oregon and British Columbia growers to compete with other growing areas with more favorable growing conditions. I think the only way we will get consistently higher yields is to switch to varieties more adapted to our cooler conditions.

WEATHER HISTORY – WSU Long Beach Research and Extension Unit

	Precipitation (inches per month)						Monthly Growing Degree Days (based 45°)				
Month	2010	2011	2012	2013	20 yr. Ave.		2010	2011	2012	2013	20 yr. Ave.
January	13.2	12.2	12.4	10.2	12.2		83	28	21	3	45
February	8.2	7.8	7.1	6.5	7.7		56	4	43	9	35
March	9.5	10.6	15.6	6.6	9.2		72	22	29	57	60
April	7.9	8.4	9.2	6.4	6.2		92	29	103	90	107
May	3.9	4.8	4.7	5.3	3.9		180	158	182	249	232
June	4.9	1.9	4.1	2.5	2.9		290	323	290	326	332
July	0.9	2.3	1.1	0.2	1.2		377	414	397	408	436
August	1.5	0.4	0.3	2.4	1.7		411	453	468	235	441
September	5.6	3.3	0.5	8.2	2.7		382	370	350	429	376
October	7.8	5.4	12.7	3.0	7.6		220	205	179	177	212
November	13.2	10.4	13.0				85	28	103		
December	14.7	4.6	18.5				35	9	26		
Totals	91.4	72.2	99.0				2283	2043	2142	*	*

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