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CRANBERRY VINE

WSU Long Beach Research and Extension Unit
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June 2009

Meetings

Pesticide license exams are being offered June 22, 2009, at WSU Long Beach REU. Growers must have a Private Applicator license to apply restricted-use pesticides and buy through the grower associations. Exams for the license can be taken in Olympia at the WSDA office. Save yourself a trip and take the exam at WSU Long Beach on 6/22/09 at 1:00 p.m. WSDA will provide an examiner and exams of your choice. Please let me know (360-642-2031) if you plan on taking the exam so I can get a head count. Exams are available in Spanish, by request. To obtain study material for any of the exams, you can download the order form, found at the website http://cru.cahe.wsu.edu/CEPublications/c0886/c0886.pdf and request the Private Applicator Pesticide Education Manual MISC0126. Cost is $16.50.

As an aside I will be conducting a review class for the aquatic certification license from 9 a.m. to 12 noon (3 pesticide credits offered).

Washington Cranberry Summer Field Day. Friday, July 31, 2009. Registration at 8:30 a.m., program 9:00 a.m. to 2:00 p.m., salmon barbecue lunch at noon and a grower potluck dinner at PCCRF the evening before at 6 p.m.

This year's program will feature pest management, irrigation, root growth, drainage, and germplasm. Several out-of-state experts in those fields will be the invited speakers.

Oregon Farm Science Review, August 6, 2009. Call Linda White at 541-572-5263, OSU Extension, for details.

British Columbia Field Day, August 18, 2009, at Raj Bath Farm. Call BC Cranberry Marketing Commission at 604-307-1046 for details.

Waste Pesticide Pickup. With the cancellation of Diazinon 14G and other products (e.g. Guthion), it is important that growers dispose of unused product. The WSDA pesticide disposal program is offering this opportunity. The date is July 31 after Field Day at WSU Long Beach. This will be for small amounts of chemicals only (limited to four 50# sacks or four 5-gallon containers). No advanced paperwork will be required for collection of these limited amounts. However, please notify me beforehand (360-642-2031) so we can make sure to have enough space set aside to process all the deliveries. Also, double bag the sacks or containers you bring to protect against spills in transport or handling. If you have larger amounts of waste pesticide, arrangements will be made for a pickup at your farm the following week. Call Joe Hoffman, WSDA Waste Pesticide Program Coordinator, before July 10 at 360-902-2048 to schedule that pickup.

I know that several farms have not taken advantage of this opportunity in the past. To prevent any liability problems, or if you ever want to sell the farm, I can not emphasis enough how important it is to safely dispose of all your old pesticides. Don't miss this opportunity!

Cranberry Management

Cranberry Pest Management Guide EB0845: This annually updated guide is now only available on-line and can be downloaded for free as a PDF file. The 16-page 2009 version is already out and can be found at http://cru.cahe.wsu.edu/CEPublications/eb0845e/eb0845e.pdf

Weed control

Old Herbicides: Several of the traditional cranberry granular herbicides are being phased out. United Phosphorus is replacing Devrinol 10G with 50 WP formulation. The product works the same and there is no loss in activity if applied and immediately incorporated with irrigation.

There is also similar concern about the fate of Evital 4G. With the increased availability of broadcast-applied herbicides, growers will need to think about obtaining systems for accurate low-volume broadcast application of herbicides. We will demonstrate several of these during field day.

New Herbicides (or lack thereof): My much-heralded cure for buttercup was pulled at the last minute by the registrant after 8^{+} years of making its way through IR4 and EPA. I hope to pull a rabbit out of the hat and resuscitate it this coming winter.

Weed control on new plantings: Several comments seem warranted since many new plantings have been going in. Successful weed control on new plantings is mostly about timing and rates.

The new cranberry varieties might be more sensitive to herbicides than traditional varieties. This is especially true on poorly drained sites. If vines turn red early and cease to grow it is likely the result of an overdose of Devrinol on poorly drained soil.

Extra nitrogen may or may not help overcome this herbicide stress. Use as low a rate as possible, not to exceed 25 to 30 lbs of Evital or Devrinol at 10G per acre, and lower rates in sections of beds with poor drainage. Consider using Callisto instead of traditional pre-emergent herbicide, or very low rates of pre-emergent herbicide followed by Callisto as needed.

I prefer to wait until I just begin to see new weeds emerging before making a pre-emergent herbicide application. Callisto applied in early growth phase is very effective on most of the weeds that escape. If willows have been a problem, light Evital mid to late June when the seeds are flying is normally a good control. Horsetail is often a problem on new plantings. Casoron is too hot to consider and I recommend Callisto while horsetail is still small. It won't kill the plant, but it will stunt it and hopefully prevent additional spread.

Insect Control

Diazinon 14G: WSDA has canceled SLN WA-060014. This SLN had provided for the use of Diazinon 14G for the control of cranberry girdler. **Existing product can not be used in Oregon or Washington!**

Cranberry girdler: With the loss of Diazinon 14G, growers should plan on ordering their nematodes earlier. Product is frequently sold out for last-minute shoppers. Pre-wet leaves and ground before applications, apply in the evening (they are UV sensitive) and incorporate with 3-4 hours of irrigation on day

one and then maintain a similar irrigation scheme for several days post-treatment. This treatment is too expensive to not put out correctly.

Blackvine Weevil: There is a major change in weevil control recommendations for 2009. Start with an aggressive night sweeping program to monitor for first adult emergence and feeding, then treat with an Avaunt and/or Assail application at first emergence. Night sweep 4 to 8 days after treatment to assess if an additional adulticide application is needed. Repeat weekly sweeping and adulticide treatments until sweeping counts are at or near zero. Don't use Avaunt more than twice in a row to avoid insecticide resistances. For details on use, see the **2009 Cranberry Pest Management Guide EB0845** or the 2EE label for Blackvine Weevil Control. See http://www.cdms.net to find any label.

New Insecticides: Assail, Avaunt and Delegate are three relatively new insecticides that I encourage growers to use. Delegate is a great OP replacement for fireworm control that works well with chemigation. Avuant and Assail are recommended for adult weevil control at first emergence.

Low–odor Lorsban. A new product that doesn't have the foul smell, called "Lorsban Advanced," is available from Dow. It has the same use rate, PHI and REI as the traditional product.

Disease Control

Fungicide update. Below is a review of the effectiveness of cranberry fungicides from Dr. McManis, Wisconsin Cranberry Crop Management Newsletter May 1 2009.

Abound. Spotty efficacy for fruit rot control, good on Cottonball, but not as good as Orbit or Indar.

Bravo, Echo, Equus. Excellent for fruit rot control. May reduce yield if applied during bloom, and may cause red flecking or burns on fruit if applied during bloom and pin head-size fruit, especially on hot days (>85° F). The Weather Stik and Bravo Ultrex, may be more prone to fruit scarring, according to Dr. Frank Caruso at the University of Massachusetts.

Copper-based fungicides. Little fruit rot activity, but good for Rose Bloom.

Indar. Good on cottonball control, inconsistent on fruit rot.

Mancozeb, Maneb Dithane. Excellent for fruit rot, not quite as good as Bravo, can reduce fruit color if applied during bloom or frutiset.

Nutrient management

As you may have noted, the price of fertilizer has risen rather dramatically since last year. The following table is the cost to growers in 2009 for an actual pound of nutrient. It is interesting to note the difference per unit. Urea (46-0-0) is by far the cheapest source of N at $0.45/#, while 6-24-24 is 16 fold more expensive per unit of N. 0-45-0 is the cheapest source of P, with most other sources about four times the cost. 0-0-50 is the cheapest source of K, and liquid 6-24-6 is ten-fold more expensive.

Normally the cost of the fertilizer is a rather small component of operational cost, but fertilizer cost can be significant. For example three applications of 150 # of 6-24-24/ac plus 3 doses of liquid 6-24-6 at 3 gal/ac cost $260/ac. Similar levels of nutrients could be provided for about half the price if other choices were made.

Choices of fertilizers, rates and timings are a matter of personnel preference, tradition, and copycatting and don't always reflect actual plant needs or lowest cost.

Based on extensive research from Wisconsin, Massachusetts and Oregon, the optimal annual fertilizer rate for cranberries runs about 20 to 40 #/ac for N over 3 to 4 doses, 45 #/ac for P2O5 over 2 to 3 doses, and 60 to 80 #/ac for K20 over 2 to 3 doses. This will vary some by variety, location, soil type and crop level, but is a good general guideline.

Nitrogen and potassium both leach from the soil and need more frequent light applications than phosphorus. Using a product with a high ratio of phosphorus to nitrogen like 6-24-4 will provide an oversupply of P. For example, growers using a total of 500 lbs of 6-24-24 on a McFarlin bed to get adequate levels of 30 lbs of N would get almost three times more P_2O_5 than they needed (120 lbs) and twice the K_20 they needed (120 lbs). In addition to an over-supply of nutrients is the added cost of applying low–analysis bulky product.

Nitrogen tends to be the most limiting nutrient for Washington beds. But is also the one that can cause the most problems if over-applied. It is quickly leached from sandy soil, while on some muck or peat soils very little nitrogen may need to be added at all.

Few things can do as much damage to a McFarlin bed as too much nitrogen applied too early. Recovery from the resultant over-growth can take years. Too much nitrogen is also problematic for inducing fruit rot on all varieties. This is something fresh fruit growers have to pay particular attention to. Too little nitrogen on Stevens or Pilgrim beds on sand, on the other hand, can markedly reduce bed vigor and yield.

Because of these nuances, I am reluctant to provide general advice on nitrogen fertilizing. Instead growers need to learn how to read beds for their nitrogen needs and read the excellent extension publication EM 8741, "Nitrogen for bearing cranberries in North America." You can download this publication from http://extension.oregonstate.edu/catalog/pdf/em/em8741.pdf.

Since most growers use more than ample phosphorus and potassium, these nutrients are rarely limiting yields in Washington beds. The following article by Dr. Hart provides great detail on K fertilizing. Aim for the target levels suggested earlier and apply over several times during "critical' time periods like early bloom, set and early fruit growth. Unlike nitrogen, excess rates of P and K, in moderation, are not likely to cause major yield losses, but will result in leaching and unnecessary cost.

Table 1. 2009 Fertilizer prices per unit of nutrient.

Fertilizer Description	Cost per pound of nutrient		
	N	P_2O_5	K_20
46-0-0	$0.45		
21-0-0 Viking	$0.95		
21-0-0 Woodburn	$0.75		
0-45-0		$0.63	
0-0-50			$1.19
0-0-22			$1.13
12-12-12	$2.44	$2.44	$2.44
14-14-14 IBDU	$2.84	$2.84	$2.84
14-14-14 K2SO4	$2.29	$2.29	$2.29
0-23-25		$2.02	$1.86
10-20-20	$3.86	$1.93	$1.93
6-24-24	$7.21	$1.80	$1.80
0-11-23		$3.22	$1.54
6-24-6 liquid	$10.80	$2.68	$10.80

Money saving ideas to reduce potassium fertilizer cost for cranberry production

By Dr. John Hart, OSU Extension Soil Scientist.

Growers used to say that fertilizer was "cheap insurance." The statement is no longer true.

Fertilizers, especially potassium and phosphorus, are expensive.

Growers have changed from thinking of fertilizer as cheap insurance to asking, "How can I reduce my fertilizer cost?" No magic or "quick fix" exists even though the answer is simple and straightforward. Apply fertilizer where it is needed or will provide an economic benefit. Potassium application on many cranberry beds can be reduced without a reduction in yield. The key to saving on potassium cost is knowing where to reduce.

Knowing when and where fertilizer is needed requires management and monitoring as used for nitrogen. Cranberry growers monitor leaf N to evaluate N status and adjust application rate. The same approach can be used to manage potassium. Think of monitoring soil and tissue concentration of potassium as you monitor fuel or oil pressure in an engine or temperature for spring frost control.

A better analogy might be dieting. Approach a reduction in potassium application as you would approach a weight loss program. Don't make large or sudden changes. Change slowly or incrementally while monitoring tissue K and build confidence the reduction is producing desired results.

First, you need a goal. We'll use OSU recommendations for soil and tissue K. The target is to have soil test K between 50 and 100 ppm and tissue K should be between 0.40 to 0.75%. Potassium is recommended at 0 to 60 lb K_2O/ac if soil and tissue is in this range. Let's look at yields from two cranberry beds where soil and tissue K were in the recommended range and potassium was applied or withheld for three years.

Tale of two beds: Potassium chloride (0-0-60) was applied on two cranberry beds for three years beginning in 1996. The treatments supplied 0, 60, 120, 180 K_2O lb/a. The fertilizer was applied monthly beginning in mid-April at roughneck through full bloom in mid-June. One bed was in Coos County and had five-year-old Stevens cranberries growing in it. The second bed was in Curry County and had six-year-old Stevens growing in it.

Yield was measured in 1998, after three years of treatments. There was not a difference between treatments receiving potassium for three years and the treatment that did not receive any potassium for three years, as shown in Figure 1. Yield from both beds was similar, so a single line is used to represent yield from both beds.

Let's look at soil and tissue data for an explanation to the unchanged yield. The initial potassium application did not change soil test K in the fall of the first year as shown in Table 2. This result was expected since soil test K was adequate and the fertilizer was top dressed.

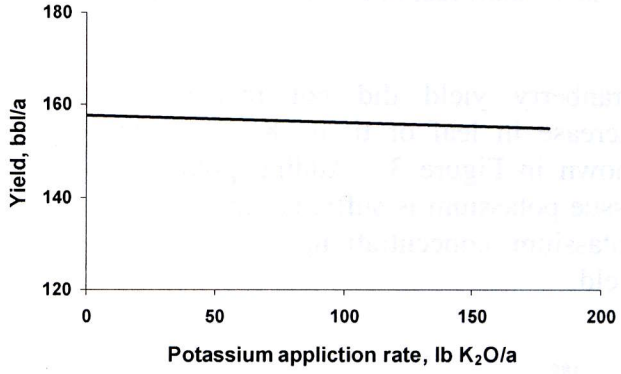

Figure 1. Cranberry yield influenced by potassium application from both sites in 1998, after three years of potassium treatments.

Table 2. Potassium application rate and cranberry bed potassium soil test value in September 1996.

K_2O	Coos	Curry
lb /a	ppm	
0	73	54
60	76	53
120	79	52
180	79	62

After three years of application, tissue K increased slightly with increasing K application at the Coos County site. All tissue values, even those receiving no K fertilizer for three years, were within OSU's recommended range. Since tissue K was adequate without K application, addition of K fertilizer should not increase yield.

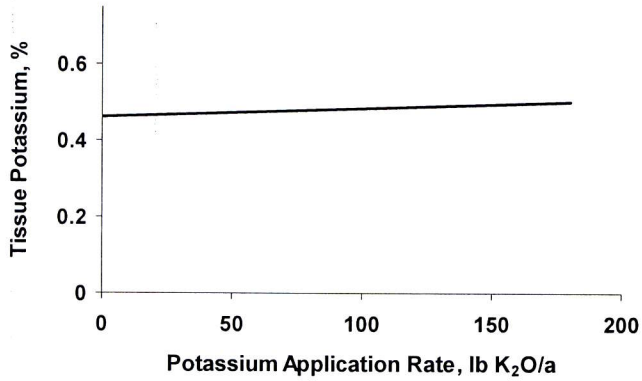

Figure 2. Cranberry leaf potassium concentration change with potassium fertilizer application rate at the Coos County site. Tissue concentration is from 1998, the third year of fertilizer treatment.

Cranberry yield did not increase with an increase in leaf or tissue K concentration as shown in Figure 3. Adding potassium when tissue potassium is sufficient may increase leaf potassium concentration, but does not alter yield.

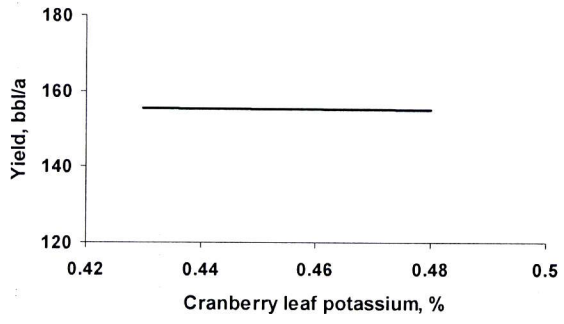

Figure 3. The relationship of cranberry yield and leaf potassium concentration at both sites in 1998.

Summary: Yield and berry color were not changed by potassium application when tissue K was between 0.4 and 0.75% and the soil test potassium was between 50 and 100 ppm. These results show that the soil and tissue measures of potassium can be used to monitor potassium need. When tissue and soil values are in this range, potassium application is optional and can be reduced or eliminated for at least a year to two without reducing cranberry yield.

Remember the comparison of reducing potassium application to save money and dieting? Don't make large or sudden changes. Reduce slowly and monitor tissue potassium annually.

If you have tissue K in the upper end of the adequate range and have been applying potassium regularly, then you could reduce your fertilizer cost by reducing potassium rate.

Grower results from a low potassium "diet": In 2003 a south coast Oregon cranberry grower was using about 130 lbs K_2O in various blends starting in the spring and finishing after fruit set. The potassium application was gradually reduced until only 70 lb K_2O/a, 20 lbs in the spring and 50 during fruit set, were used in 2007 and 2008.

The grower said, "This bed consistently produces 300 barrels/acre. The range is from 295-330 b/acre through those years, even with the reduction in potassium application."

The grower added, "The potassium tissue concentration did not change and was within the normal tissue concentration range of K for cranberries, 0.40 to 0.75%, during the time K application was reduced." Tissue potassium concentration is given in Table 3.

Table 3. Annual tissue potassium concentration for time of potassium fertilizer reduction.

Year	Tissue potassium
	%
2004	0.56
2005	0.61
2006	0.54
2007	0.53

Annual testing of cranberry uprights is necessary when potassium fertilizer is reduced. Changes in tissue concentration probably will not be noted for at least three years if potassium was sufficient in soil and tissue and more than 80 lb K_2O/a was applied annually.

Similar Results from Wisconsin Potassium Application: Teryl Roper, former University of Wisconsin Extension specialist, established plots in two 'Stevens' beds. He applied consistent rates of nitrogen and phosphorus to the plots and varied only potassium application, between 0 and 800 pounds of K_2O per acre. Treatments also compared potassium sulfate and potassium chloride at 200 and 400 pounds per acre. Fertilizer was applied at roughneck, bloom, fruit set, and in early August.

Potassium application increased both tissue K and soil K, but not always significantly. The results were more pronounced in 2006 than in 2007. They also found that increasing the application rate of potassium did not increase yield or fruit size in either year.

Because some of the treatments were potassium sulfate and some were potassium chloride, they were able to determine if chloride was detrimental to cranberries. No effect of chloride as opposed to sulfate forms of potassium fertilizer was measured within the range tested.

Some growers believe that large late season applications of potassium will result in better fruit color. To test this hypothesis, fruit was analyzed for color. No effect of potassium fertilizer rate on fruit color was measured in either 2006 or 2007.

The research in Wisconsin did not measure a change in yield, fruit size, or fruit color from potassium application. Also, both the sulfate and chloride forms are acceptable fertilizers for cranberry at the rates tested.

An earlier trial in Wisconsin performed by industry researchers showed a 5% yield reduction when a single mid-July application of 180 lb K_2O/ac was made. The yield decreased 10% when 270 lb/a K_2O was applied in a single mid-July application.

In addition to yield, growth reduction and hardening were measured. No reduction in tissue N, hardening, or other growth-reducing properties of potassium were measured until 1440 lb K_2O /ac was applied. This amount of potassium burned and killed vines.

Potassium doesn't slow growth or increase berry size: Oregon research supports the idea that when soil and tissue potassium are adequate, potassium application doesn't "shut down" or "put the crop to sleep", stop overgrowth from excess N, increase bud set, berry color or berry size.

This statement is supported by Figures 4, 5, and 6. Figure 4 shows that berry size does not change with potassium application at either location after two years of potassium treatments.

The line representing berry weight at the Coos County site appears to increase. It changes from 1.32 grams/berry when no potassium was applied to 1.38 grams/berry when 360 lb K_2O was applied. The change was not different statistically.

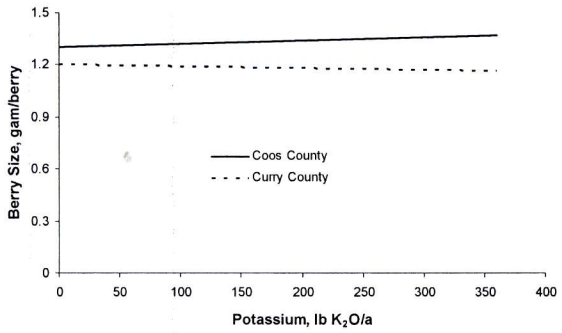

Figure 4. The relationship of berry size to application of potassium fertilizer rate from 1997 harvest.

The idea that potassium application will stop or reduce growth has never been supported and the data in Figure 5 shows an opposite trend. The data is an average for both sites.

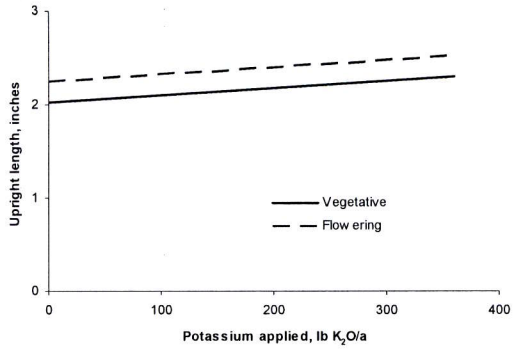

Figure 5. Average upright length with potassium application rates at harvest in 1997.

Application of 360 lb K_2O/a did not change growth of either flowering or vegetative upright length. This supports the idea that potassium fertilizer can't be used as a growth-retarding treatment.

Another idea commonly voiced is that potassium will enhance bud set. If potassium is adequate, we did not find any difference in upright number with potassium treatments, as shown in Figure 6.

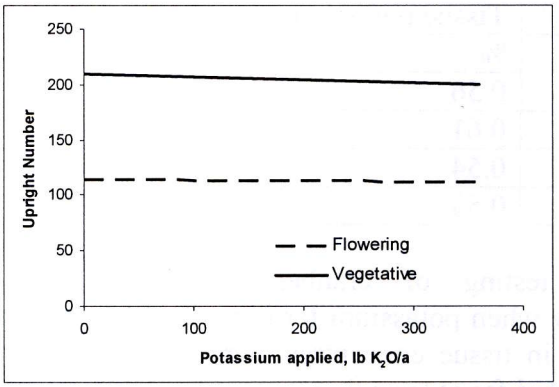

Figure 6. Average upright number for both sites for potassium application at harvest in 1997.

Other ideas for saving $ by reducing potassium: If bud set is influenced by potassium, upright number and yield should be changed. Potassium application did not change either upright number or yield.

Don't apply potassium fertilizer to harden vines or counteract overgrowth. Research has not documented potassium providing any benefit for retarding growth or hardening plants.

Reduce or remove foliar application. If tissue K is adequate, potassium is not needed from a soil or foliar application. Foliar products are usually more expensive per pound of nutrient than dry fertilizer materials.

Compare the cost of potassium chloride and potassium sulfate. Usually, potassium chloride or muriate of potash (0-0-60) is less expensive per pound of K than is potassium sulfate.

Application of 20 to 30 lb/a K_2O as potassium chloride three to four times a year allows leaching of chloride between applications.

Cranberry Management

Frost Protection:

Not a year goes by when a grower doesn't have a partial crop loss from a frost event on one of their beds. Aside from the inevitable equipment failure and plugged sprinklers, the most common problem I see is with the way growers set their frost sensors. The sensor needs to be exposed to open sky at vine tip level at the lowest elevation of the coldest bed.

A sheltered sensor on a warmer bed can read 10° F higher than what tender tissue is experiencing in low sections of your beds.

Miscellaneous Information:

The best weather web site for PNW agriculture is the Weather Café, by Rufus La Lone. Rufus does an excellent job of predicting major weather events that impact agriculture.
http://www.ovs.com/weather_cafe.htm

Optimizing Pollination:

One of the easiest things growers can do to improve yield is to assure a good pollination occurs. Here are seven points to consider.

Rent strong colonies: A hive rented for $60 with 30,000 bees is 1.5 X more productive than two hives rented for $50 each with only 15,000 bee/hives.

Don't skimp on hive rental: At the current price of cranberries, you only need for that hive to increase yield by a little over one barrel/acre to come out ahead. With that in mind, it is foolish to not maximize colony density. What is the optimal stocking density? Depends on the variety, number of other bees in the area, the weather etc, but with high-producing beds, using the above economics, it would be easy to justify >3-4 colonies per acre. Since 2008 was a major "off year" in production, 2009 should be a good cropping year. This would be the year that I encourage growers to have more hives than normal.

Optimize the bees you rent: Based on pollen tetrad loading, you need 8 tetrad (pollen grains) to get maximum fruit size, and one visit by a nectar-foraging honey bee is just about adequate to obtain that maximum fruit size. Therefore anything that you can do to get a few extra bee visits will increase production.

This would includes placing hives at a good warm site away from winds on bed edges, putting hives on a pallet off the ground and maintaining weed-free entrances. This will all add up to a few extra bee foraging hours per day.

Timing of colonies in beds. I was never a fan of too early placement of bees. However, based on the work we did several years ago, there may be some advantages in some years on some varieties. We put bee exclusion cages over Stevens 5/14 to 6/2 in 1993 and 5/17 to 5/26 in 1994 (~ 1st 25% of bloom) and compared yield to where we had no exclusion cages. 1993 was an off year and there was only a 17 bbl difference in early-caged vs no-caged plots (not significant). However, 1994 was an "on year" and there was a 110 bbl difference (453 vs. 342 bbl/ac).

In a similar experiment on McFarlin, there was no treatment difference in either year. In other words, getting those first blooms pollinated may only be a benefit on high-producing beds in "on years', but over the course of several years it is likely to be a net benefit.

Observe your hives: Based on observing foraging activity at the entrances, record

which colonies are weak, how many are strong, and which ones swarm, etc.. Share this with your bee keeper. He or she should supplement or replace weak colonies.

Be kind to your pollinator: Don't use insecticides during bloom that are not bee-friendly. Being overly zealous in killing a few fireworm that come out early with an evening spray of Diazinon doesn't make a lot of sense if it results in a reduction in your foraging honeybees in the days following treatment.

Promote nectar flows: Pollination seems to occur in waves of nectar flow. Nectar flow is a function of healthy vines and good photosynthesis activity. A day of bright sunshine, following cloudy rainy weather, is conducive to nectar production and normally brings out the bees.

There is little we can do to manipulate these weather events, but if we are mindful of these events and don't hinder bee activity when they occur, like mid-day irrigation or insecticide application, it will go a long way to increase pollination. We can, however, do a lot to promote healthy flowers with fully functional nectaries, such as good frost protection, minimal use of Casoron, and good bed nutrition in the previous year.

WEATHER HISTORY

	Precipitation						**Growing Degree Days**				
Month	**2006**	**2007**	**2008**	**2009**	**20-year average**		**2006**	**2007**	**2008**	**2009**	**20-year average**
January	20.9	6.9	10.5	10.8	12.2		30	9	4	23	46
February	4.7	10.4	5.4	3.7	7.8		26	33	16	20	45
March	7.8	11.0	9.7	7.7	8.3		29	66	12	10	69
April	4.3	4.1	5.3	4.2	6.3		90	104	43	61	120
May	4.8	2.1	2.5	4.8	3.7		208	205	230	214	248
June	4.7	2.8	2.4		2.9		345	294	244		341
July	0.7	3.6	0.5		1.3		399	495	364		448
August	0.0	1.8	4.0		1.9		332	464	425		457
September	1.7	1.2	0.9		1.9		349	323	326		380
October	0.0	11.1	4.9		7.1		177	152	166		217
November	22.6	6.3	11.1		11.7		78	53	138		88
December	12.4	13.2	11.3		12.2		36	20	16		35
Totals	**84.7**	**74.5**	**68.5**		**77.3**		**2099**	**2217**	**1984**		**2495**

The 20-year averages are from January through May, 2009, and from June through December, 2008.