

Oregon Blueberry Newsletter



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Tech Corner

Flower suppression using PGR

Plant growth regulators (PGR) are plant hormones which play some vital roles in root and shoot growth, fruit set, fruit ripening, disease resistance, leaf senescence, plant dormancy, etc. GA₄₊₇ (a PGR known as ProVide in the apple industry) has been shown to be a useful tool to suppress flower bud initiation in young blueberry plants. Experiment conducted recently by Black and Ehlenfeldt in New Jersey found that GA₄₊₇ could inhibit flower buds initiation on the 1-year-old wood therefore reducing the number of flowers the following growing season. The application timing seems to be at later summer and early fall. On going field experiment in the northwest has shown variable response of blueberry cultivars to the application of GA₄₊₇. Once the application timing is determined for various blueberry cultivars, GA₄₊₇ application could become a viable cultural practice to save the labor costs of floral tissue removal in newly established blueberry plantings in the northwest. The successful commercial use of GA₄₊₇ may also have implications as a thinning agent to reduce crop load therefore reducing pruning cost.

Season Recap

Although the official blueberry production statistics is unknown at this point, Oregon's blueberry production is guesstimated to be at 45 million lbs for the 2008 growing season. This represents a similar production level comparable to last year. It is believed that a decrease in production from mature fields was compensated by the new plantings coming into production. With more and more blueberry acres planted, this year's processed price has dropped significantly compared to the price of last few years. With lower price in processed blueberries, let's hope more food products containing real blueberries can be developed so the demand for blueberries will be increased in the future.

Blueberry extension publications/services

OSU offers insect diagnostic services:

Blueberry pruning DVD:

<http://extension.oregonstate.edu/catalog/abstract.php?seriesno=DVD+2>

http://www.science.oregonstate.edu/bpp/insect_clinic/index.htm

Blueberry cultivar guide:

<http://extension.oregonstate.edu/catalog/pdf/ec/ec1308-e.pdf>

Blueberry fertilizer guide:

<http://extension.oregonstate.edu/catalog/pdf/em/em8918.pdf>

Blueberry economics:

<http://esc.orst.edu/agcomwebfile/edmat/EM8526.pdf>

Blueberry gall midge:

<http://esc.orst.edu/agcomwebfile/edmat/EM8889.pdf>



More on pruning

By B Strik and W Yang

Some of you may have already started pruning your blueberries. We recommend you think about some of the basics of pruning before heading out. Recently, there was an article in Dr. Gary Pavlis's newsletter on pruning. If you don't receive his newsletter by mail, you can access it on the internet at <http://www.rce.rutgers.edu/pubs/blueberrybulletin/2001/b-b-v17n20.pdf>

We would like to add some more specific information for our region. Although the basics of pruning are the same, here we have more vigor and lower light levels – thus pruning practices differ some from those in New Jersey. Bernadine Strik and Ed Hellman recently completed a pruning study where they compared conventional pruning (basal cane cuts and top “working”), speed pruning (removing one or two canes/bush) to no pruning. This study was done over 5 years in mature ‘Berkeley’ and ‘Bluecrop’.

Here are some things to consider based on pruning basics (some from Dr. Pavlis's article and some from our work).

Pruning reduces yield. After 5 years, un-pruned ‘Bluecrop’ still had a higher yield than speed or conventionally pruned. However, there are other reasons to prune. Pruning improves bush architecture. For example, un-pruned bushes could not be machine harvested (poor bush shape and too much dead wood) and had fewer flowers and berries/lateral due to poor light exposure. Pruning improves berry size, advances maturity (by about 4-5 days) and improves picking efficiency when hand harvesting. Also, ‘Bluecrop’ had more red-colored berries before and after freezing in un-pruned bushes. Speed pruned bushes had a similar yield to conventionally pruned after 5 years, but took 60% longer to hand harvest due to poor bush architecture.

Pruning methods and severities differ with plant age, vigor, and cultivar. Look at how “balanced” the bush was for fruiting and vegetative growth before pruning. If it put on a lot of new growth, it could have supported a higher crop last season. In contrast, if there is little good one-year-old fruiting wood and few new whips near the base, then it was cropped too heavy – adjust your pruning accordingly to get the bush into balance.

In general in Oregon, bushes are more vigorous and can support a larger crop than in most other production regions. Canes thus become unproductive at a younger

age than in eastern production regions. For example, Gary Pavlis suggests that canes more than 10 years old are no longer productive. However, here we rarely have canes older than 5 years in a bush – we get replacement canes that are more productive. As a rule of thumb, a mature bush should have about 10-12 canes with a relatively equal distribution of one-, two-, three-, four-, and five-year-old canes when looking at the base of the plant. In a cultivar like ‘Berkeley’ you'd need to count canes about a foot off the ground, as they don't produce whips at the base of the plant.

Remove diseased or dead canes first. You may want to dip your pruners in a bleach solution after removing diseased wood, especially when pruning near or after bud break. In addition, “top working” the bush by removing twiggy, non-productive wood and shortening some fruiting laterals/wood can improve berry size.

Table 1 demonstrates the relationship between berry size and number of fruiting woods. For example, if you leave more than twice the fruiting wood (81 vs. 39) to achieve the same yield, your berry size will be much less (1.2g vs. 2.5g).

Yield (lbs)	Berry wt (g)	Fruit # /flower	Flower buds # /shoot	Fruiting wood #
20,000	2.5	8	8	39
20,000	1.7	8	8	57
20,000	1.2	8	8	81

Wood # = yield/berry wt/fruit #/flower buds #/1452

Finally, let's do a simple excise of pruning and cost on one acre of blueberries. Table 2 shows the total pruning cost based on an hourly wage of \$10 vs. \$8. You can see spending 1 minute per plant will cost more than \$200 per acre. So your pruning budget could have a much bigger impact on your pruning practice more than anything else.

Total cost	Cost	Time/plant	Cost	Time/plant
200	10	0.8	8	1.0
300	10	1.2	8	1.5
400	10	1.7	8	2.1
500	10	2.1	8	2.6

Based on 10'x3' spacing, 1452 plants per acre

Stabilizing soil pH

By Wei Yang

Fields with pH ranges out of the optimum (4.5-5.5) are common in blueberry production. I know you all feel confident about applying elemental sulfur to reduce soil pH to the desired range, but what should you do if your soil pH drops below 4.5 and how that will affect blueberry plant growth?

Let's first understand why soil pH keeps decreasing every season with fertilization in blueberry fields. We all know blueberries prefer ammonium-based fertilizer as their nitrogen source. This actually is the primary reason why your soil pH keeps decreasing every season. During the uptake of ammonium ions, blueberry plant roots secrete hydrogen ions into the soil and accumulate in the soil to bring down the soil acidity. When urea is used, it will first break down to ammonium and carbonate by urease. This process takes one hydrogen ion away from the soil, so urea is less acidifying than ammonium sulfate fertilizer. Then ammonium may form ammonia (NH_3), so soil pH close to the urea particles could increase temporarily. Because of the eventual uptake of ammonium by blueberry plants, the long-term effect of urea on soil pH will still be a reduction in soil pH.

Now, what can you do to reduced the rate of soil acidification in blueberry production? We can calculate the liming factor (or acidifying potential) of different fertilizers and add lime to neutralize it. Unfortunately, the acidifying potential of these various nitrogen fertilizer is calculated based mostly on their nitrification in the soil and blueberry plants take up most of the nitrogen fertilizer in the ammonium form, this traditional way of determining lime requirement may be of limited use for blueberries.

Since the majority of soil acidity in blueberry production is mainly due to root exudation of hydrogen ions into the soil by removal of cations, such as ammonium ion, calcium, magnesium, and potassium from the soil under low soil pH conditions, the soil acidification or the amount of lime required can be estimated by the ratio of base cation to nitrogen in plant tissues. I estimated this ratio for blueberry plants is around 0.7-1.0. So take the high number of the ratio, for one acre of blueberries with a 20,000 lbs yield in the Willamette Valley, about 170 lbs lime is needed to neutralize the soil acidification potential due to fertilizer uptake. This means that you can apply about 150 to

200 lbs of lime every fall before the raining season to stabilize your soil pH!

The best time to apply lime is in fall before the raining season starts. Also the amount lime mentioned so far is for band applications within the planting row. It is not the broadcast application rate. Remember, do not over-lime and do not lime in the spring.

I know liming blueberry fields sounds really strange because blueberries love acid soils and are calcifuge (calcium avoiding) plants. However, the benefits of adding some lime in the fall (not spring) to maintain a desired soil pH range have been practiced in the Valley by growers. We can all argue about the calcifuge's nature of blueberries, but with the raining winter in Oregon, some calcium ions are leached out of the root zone which may not be a big concern for us.

If you have low pH (<4.5) in your blueberry field already, free soil aluminum could interfere with nitrogen, phosphorus and iron uptake. You can do two things to relieve this problem. First, you will need to start bringing the soil pH up gradually. This could be a long process since lime moves into the soil profile slowly when surface applied. You can add 200 lbs lime/acre in addition to the lime you need to neutralize the potential acidity produced by fertilizer uptake during the growing season. You can do this for a few seasons, and then wait a few more years to test the soil pH to see if more lime is needed. Secondly, you can find ways to reduce the concentrations of free soil aluminum in the soil. Increase soil organic matter such as sawdust mulch will reduce free soil aluminum concentrations over time.

Finally, I like to mention the difference between sulfur (S) and sulfate ($\text{SO}_4^{=}$) on soil acidity. There is a misconception about sulfate that it reduces soil pH. The reality is sulfate does NOT reduce soil pH. When potassium sulfate or ammonium sulfate are applied as potassium and nitrogen fertilizer, the sulfate group in both fertilizers will either be taken up by the plants or lost to leaching, a process which does little to change soil pH. When elemental sulfur is applied to the soil, however, it will be oxidized by sulfur oxidizers (bacteria) such as *Thiobacillus species* or other heterotrophic sulfur oxidizing fungus such as *Aspergillus niger* and *Trichoderma harzianum*. This process produces sulfuric acid, therefore soil pH is lowered. Strangely enough, the rate of elemental sulfur oxidation increases with soil pH. This is because soil bacteria are more active at higher soil pH.



OSU Blueberry Pruning Workshop
North Willamette Research and Extension Center
1:30-4:30PM, December 22, 2008

This workshop is for blueberry growers who like to learn how to prune blueberries and/or to refresh their pruning techniques. An in-depth look at the effect of pruning on blueberry plant growth and yield will be examined. Pruning techniques for new and established plantings will be discussed in terms of pruning efficiency and cost. Below is the workshop agenda.

1:30-1:50pm Presentation to discuss the physiological effect of pruning on plant growth and yield, including efficiency and cost of pruning techniques for both young and established fields.

1:50-2:20pm Watching the Blueberry Pruning DVD. We will discuss the techniques demonstrated in the DVD while watching the 'movie'.

2:20-2:30pm Coffee break

2:30-4:30pm Field pruning demonstration and prune real blueberry plants.

Please bring your own pruners and dress to the weather!

Organizer: Wei Yang

Cost: \$15 per person.

The workshop will be limited to 40 people. Please register by calling the NWREC 503-678-1264 ext 110. Early registration is encouraged.

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