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What's Inside

Have you seen this bug? The marmorated stinkbug continues to spread from its initial sighting in Pennsylvania. If you see this bug, bag it and report your sighting to your local cooperative extension office.

This month's issue of NYBN kicks off with an article on the marmorated stinkbug and its identification from Entomologist Dan Gilrein of the Long Island Horticultural Research Center, followed by a Cornell berry research update provided by Lori Bushway. We are also continuing to spotlight new crops for consideration with this month's article on Aronia and Elderberry, by Steven McKay. Other features include articles on preparing your plantings for winter such as cold acclimation and mulching of strawberry, and blueberry pruning and mulching. Also featured, the third of a series of articles on Food Safety and Produce, Part IV of a series on on-line visual image galleries of small fruit diseases and disorders, and two reviews of potential additions to your small fruit reference library.

UPCOMING MEETINGS

December 7, 2004. *Agribusiness Economic Outlook Conference*, Cornell University, Ithaca, New York. **Contact:** Linda Putman at 607-255-8429 or go to http://aem.cornell.edu/outreach/index.htm#outlook for details.

December 7-9, 2004. *Great Lakes Fruit, Vegetable and Farm Market Expo*, in DeVos Place, Grand Rapids, Michigan. **Go to:** http://www.glexpo.com for details.

December 15-16, 2004. *New England Vegetable and Berry Conference& New England Fruit Meetings and Trade Show*, in Manchester, New Hampshire. **Go to:** http://www.nevbc.org for details.

January 17-19, 2005. *New York State Farmers' Direct Marketing Association Conference***,** Wyndham Hotel, Syracuse, New York. Sponsored by NYSFDMA, Farmers' Market Federation of New York, New York Small Scale Food Processors Association, and Cornell Cooperative Extension. **For information**, call the NYSFDMA office at (315) 475-1101.

January 28-30, 2005. *Organic Farming and Gardening Conference***,** , Syracuse, New York. Call 607-652-6632 or e-mail office@nofany.org

February 1-3, 2005. *Mid-Atlantic Fruit and Vegetable Convention*, in Hershey, Pennsylvania. **For more information e-mail**: mailto:shap@cvn.net.

February 10-12, 2005. *North American Farmers' Direct Marketing Conference and Trade Show*, Boston Park Plaza Hotel, Boston, Massachusetts. **Go to:** http://www.nafdma.com or e-mail info@nafdma.com or call 413-529-0386.

February 14-17, 2005. *Empire State Fruit and Vegetable Expo*, On Center, Syracuse, New York. **Call:** 315-687-5734 or e-mail mailto:nysvga@twcny.rr.com

February 16-19, 2005. *North American Berry Conference- a joint conference with the North American Bramble Growers Association*, in Nashville, Tennessee. **For more information**: http://www.nasga.org/meetings/2005/berry_conference/announcement.htm

BROWN MARMORATED STINK BUG- A NEW PEST?

Daniel Gilrein, Entomologist, LIHRC, Cornell Cooperative Extension, Suffolk County, Riverhead, NY

(Editor's note: Picture courtesy of Rutgers Cooperative Extension, Rutgers, NJ)

The brown marmorated stink bug, *Halyomorpha halys*, is an Asian import that has been found in PA, NJ, MD and WV (marmorated = marbled coloration). It has spread from the first reported collection (1996) in Allentown, PA. It is a pest of stone fruit, apples, string beans, raspberries, soybeans, some landscape ornamentals and possibly other plants. It is also particularly annoying when the insects congregate in large numbers on homes in fall, as they search for protected sites to overwinter. We have had no reports to date of these stinkbugs from Long Island. More information and photos are available at: http://www.rce.rutgers.edu/stinkbug/ and http://paipm.cas.psu.edu/pdf/bmsbug.pdf. Note that it may be confused with western conifer stinkbug, which also congregates on homes in fall. The western conifer stinkbug is somewhat similar in appearance, commonly found around Long Island and not generally a plant pest.

(***Source***: *Long Island Fruit& Vegetable News, Vol.04, No. 30, Oct. 2004;*

Additional information and pictures viewed at: http://www.massnrc.org/pests/pestFAQsheets/brownmarmoratedstinkbug.html)

BERRY RESEARCH ON THE HORIZON

Lori Bushway, Senior Extension Associate in Berry Crops, Department of Horticultural Sciences Cornell University, Ithaca, NY

Strawberry

Earlier this year, Cornell researchers released the results of an antioxidant analysis of eight popular northeastern strawberry cultivars (Allstar, Annapolis, Earliglow, Evangeline, Jewel, Mesabi, Sable, and Sparkle). Earliglow was a standout with the highest total antioxidant activity, free phenolic content, and cancer cell proliferation inhibition. Superior Earliglow berries could be most effective in helping our bodies battle damaging free radicals, advancing heart health, reducing the risk of certain types of cancer, and boosting total body wellness.

But can the health value of Earliglow's fruit be affected by how the strawberry plants are grown? Do pre-plant fumigation practices, plastic mulches, or organic fertilizers, result in more healthful berries? Researchers don't know.

In hopes of finding some answers, Dr. Marvin Pritts' berry crew established a research planting of Earliglow strawberries this past growing season that includes ten different management regimes. The treatments range from conventionally managed plots to pesticide-free and organic fertilizer plots. Additional practices include the use of compost, plastic mulches (black, white or reflective), and inter-planted legumes.

The first fruit will ripen next spring. Subsequent analysis will help determine if there is a relationship between cultural practices and antioxidant characteristics of strawberry fruits, and if growers might maximize the healthy benefits of their berries by implementing specific management practices.

Raspberry

For growers around the world, high tunnels offer the opportunity to bring a crop on earlier, to extend its season later, and to produce a crop through winter. Moreover, high tunnels provide protection from rain, wind, and hail, and can reduce disease and pest pressure.

High tunnel use for berry production in New York State is limited. However, new research in this area will advance our understanding of high tunnels and their potential use. Cornell's berry team recently erected a high tunnel at the East Ithaca Farm, adjacent to the Cornell campus. With the opinion that high quality, locally grown raspberries available beyond the normal field season will fetch a higher price for growers, Dr. Marvin Pritts is experimenting with a number of different cultural practices to delay cropping of fall raspberries. The 30' x 96' tunnel also contains a small variety trial that includes several late-fruiting fall raspberry selections from Dr. Courtney Weber's berry breeding program.

(Editor's note: Earliglow picture courtesy of Dr. Courtney Weber, NYSAES-Geneva; Raspberry high tunnel production, Penn State University, photo by C. Heidenreich)

GLOBAL GAPS RESEARCH AND EXTENSION CONFERENCE

Betsy Bihn, National GAPS Program Coordinator, Depart of Food Science, Ithaca, NY

On January 11& 12 in Orlando, Florida the Global Good Agricultural Practices (GAPs) Research and Education Conference will be held. The conference will bring together scientists from diverse disciplines to present current and relevant research data related to GAPs. This research focus will be complimented by an equally strong focus on incorporating this information into successful GAPs education and extension programs. The ultimate goal is to encourage the implementation of practices that will reduce risks in fruits and vegetables.

As everyone involved in fruit and vegetable production realizes, the production and distribution of fresh produce is a very complex process. Growing standards, practices, and risks vary by commodity, farm, state, region, and country. In 1998, the Food and Drug Administration (FDA) published the *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables* that defined GAPs and their importance to produce food safety. Every attempt has been made to base GAPs recommendations on sound science, but in some cases there is just not sufficient data available to address every area of fruit and vegetable production. Fortunately, as the scientific community has focused more on produce food safety, research projects have been developed to answer questions that allow GAPs recommendations to be modified and more clearly defined. We are now at an excellent point in time to review the data and discuss GAPs research, education and extension programs while highlighting new information that can positively impact current GAPs recommendations.

Even if you decide not to attend the Global GAPs Research and Education Conference, it is important to know it is happening. Produce food safety impacts everyone involved in the production, harvesting, and packing of fruits and vegetables. Many produce buyers are requiring third party audits of farms to insure they have implemented GAPs and have a produce food safety plan. In October 2004, the FDA released their new action plan to minimize food-borne illnesses associated with fresh produce consumption. These are all indicators that produce food safety will remain important to the produce industry and continue to impact everyone involved in fruit and vegetable production.

This conference is open to everyone. If you are interested in more information, please go to www.gaps.cornell.edu or contact me at 315 787 2625 or eab38@cornell.edu. This conference is sponsored by the National GAPs Program, based at Cornell University, through a grant from USDA-CSREES and is co-sponsored by the Joint Institute for Food Safety and Nutrition.

NATION HAS ROOM TO GROW IN THE BLUEBERRY INDUSTRY

Christine Morris, Assistant Editor, The Fruit Growers News, Sparta, Michigan.

The nation's blueberry industry will continue to grow with domestic and international market opportunities, said Mark Villata, executive director fro the U.S. Highbush Blueberry Council (USHBC). "We're seeing that the awareness of the health benefits of blueberries is really driving the demand," he said.

The increased demand has convinced growers on the west coast to plant more blueberries. California growers in particular are interested in getting into the business.

"Growing conditions are optimal for blueberries on the West Coast." Villata said. "There's more acreage (on the West Coast) that's gone in with newer varieties."

The nation's 2004 highbush blueberry crop was about 269 million pounds, and about 154 million of those pounds went to fresh market. "That number is going to continue to grow each year, " Villata said. "With this increased movement you will see a lot of fruit manufacturers who want to add blueberries to their products."

Not only is the domestic demand strong, but also international demand continues to rise. Villata said the USHBC is targeting the Pacific Rim. "Japan is our largest off-shore market and has been for 5 years," he said. "Now it looks like South Korea is going to be next. Frozen blueberries will be moving there for industrial uses."

At the same time there is also increased production in the Southern Hemisphere. Chile and Argentina are the biggest producers, exporting 10.3 million pounds and 1.23 million pounds, respectively, in to the United States.

"With excellent quality and good size of production, we're able to have year-round fresh blueberries," Villata said. Their berries come in after ours is done so they fill a void when we don't have any in the market." Having blueberries year round will increase awareness. And having them in stores makes consumers think about them more, so they are more likely to buy blueberry products such as muffins or waffles.

USHBC also is trying to introduce blueberries into new markets, including ethnic groups who don't normally have high consumption.

2004 highbush crop estimate (millions of pounds)

Region	2003 Fresh and Process	2004 Fresh and Process	Percent Change
West	79.7	111	+ 39
Midwest	64	69	+ 8
Northeast	40.9	37.5	- 8
South	46.3	51.4	+11
Total – all regions	230.9	268.9	+16

Source: North American Blueberry Council

"We have to build more demand on ethnic groups like the Hispanic market, "he said, adding USHBC is reaching out to those groups. "We're doing some promotions at Hispanic grocery stores right now." "But there's a lot of markets out there we haven't entered yet."

In 2003, the average consumption of fresh and processed highbush blueberries in the United States was about 17 ounces per person, a 9% increase from 1999. A pint of blueberries is about 12 ounces.

(Reprinted with permission from: The Fruit Growers News, Vol. 42 No. 10, October 2004.)

DEMAND INCREASING FOR ARONIA AND ELDERBERRY IN NORTH AMERICA

Steven A. McKay, Extension Educator, Columbia County Cooperative Extension, Hudson, NY

Elderberry and Aronia (chokeberry) are common in different parts of Europe, but seldom seen in the US. This is a situation that is changing as products from these berries begin to appear in shops and even superstores. In spite of the high price of the fruit and its primary processed products, very little crop is actually produced in the US. There is only one Aronia producer who is located in Oregon, but several small-scale elderberry growers can be found scattered around producing mainly for local consumption. The recent rise in popularity for Aronia is due to a line of juice blends introduced by Wildland a few years ago. The juice is doing very well in Costco on the West Coast. Elderberry is appearing more and more as it replaces Echinaceae as a popular cold and flu nutraceutical. Syrup and pulp are imported from abroad. Both are used as food coloring because of their deep purple pigment.

Botanical Classification

Aronia~ The genus name Aronia has been replacing the rather unpleasant sounding common name, black chokeberry. Aronia is a member of the Rosaceae family, and the cultivars used for fruit production are from the species *Aronia melanocarpa*. The plant originated in North America, and cultivar selection was done in Europe. Cultivars are self-fertile. (*Ripe Aronia fruit, left*)

Elderberry~ Elderberry is a member of the family Caprifoliaceae with 13 species native to North America. Commercially, we are interested in *Sambucus nigra L. ssp. canadensis* (North American, formerly classified as a separate species), and *Sambucus nigra L.* that is native to Europe. The fruit clusters (*cymes, pictured right*) of the *S. nigra* cultivars are larger than those of *S. n. canadensis*. In addition, some of the *S. nigra* cultivars have superior growth habits. Elderberries are only partially self-fruitful, and planting of two or more varieties within 60 feet of one another is beneficial. It is assumed that any pair of cultivars will function as mutual pollenizers.

Cultivars

Aronia~ 'Viking' and 'Nero' are cultivars that are commonly available in North American plant catalogs. DNA fingerprinting research done in Sweden by Niklas Jeppsson has shown very little difference between available cultivars. In fact, the cultivars perform about the same commercially, and Niklas stated in an interview "it doesn't really matter which cultivar one uses. Seeds of the cultivars can even be planted, and the plants will be like their parents, quite suitable for commercial production."

Elderberry~ In the *S. nigra* species, 'Samdal' and 'Samyl' are the most highly recommended for yield and desirable growth habit (produce new suckers annually). Two North American nurseries have germplasm and are propagating these in tissue culture. In the *S. n. canadensis* species, 'York', 'Nova', 'Johns', and the 'Adams' series are available. York and Nova are touted as the heavier yielders. These cultivars are products of breeding work that ended in 1960.

Propagation

Aronia~is very easy to propagate. Softwood or semi-softwood cuttings can be propagated with mist in July. Divisions from established plants can be made at a rate of as many as 25 per two year old plant. Stool beds are often used, and of course seeds that have been stratified.

Elderberry~can be propagated from softwood cuttings in June and from tissue culture. Hardwood cuttings taken in early spring have about a 50% rooting rate, and are susceptible to damage in overly wet media. Divisions, and even seed propagation can also be used for propagation.

Cultural Practices

A**ronia~** is adaptable to a wide variety of neutral to slightly acid soils. Less fertile soils are desirable to keep plants smaller in size. It is suggested that plants be placed 0.8-1.0 meters apart and mulched with plastic to prevent weed growth. Plastic can be removed after two to three years as plants sucker and fill in the hedgerow. Plant growth is usually so dense after three to four years that further weed control within the row is unnecessary. At five to seven years, selective pruning is done to remove the oldest, thickest branches, and keep the center open. Frost protection is not necessary since plants bloom so late, mid May in New York. Aphids on shoot tips, and leaf-eating beetles are possible pests, but plants are so vigorous, that pest damage that slows them down will not have much of a negative effect. Since Aronia is in the Rosaceae family, fire blight is a potential problem, but has not been reported as such. (Above *right: Aronia hedgerow with dense mat of growth. Prune thick branches as needed*)

Elderberry~ prefers a sandy to heavy loam soil with a pH of 5.5-6.5. It is recommended that plants be set out at 0.75-1.0 meter spacing, and that every other plant be removed after three to four years. This will improve chances of getting an economic return faster. The 'Samdal' and 'Samyl' cultivars have a nice growth habit where they throw canes from the base every year in good numbers. Six to eight canes are maintained per plant to fruit the following year. Flowering takes place in mid June in New York. In the fall after fruiting, the spent canes are removed, and a rotation is maintained. This way, canes are never left for more than a year, and plants are maintained as a five to seven foot bush. Aphids, leaf wrinkling mites, birds, cane borers, mildew, and botrytis blossom blight can be pest problems. Tomato ringspot virus has been a problem in the past with *S. n. canadensis* cultivars, but is less of a problem with *S. nigra*.

Harvest

Aronia~ is mechanically harvested between August and September. Five to ten tons per hectare can be expected in about five years, once plants have matured. Some yield can be expected in the first years, but plants often have weak branches that fall over in the ground.

Elderberry~ is picked by hand in the US, although mechanical harvesting is a possibility. Twenty tons per acre are produced in Denmark, while four to twelve tons per acre are recorded in New York. The *S. nigra* cultivars are higher yielding, especially when grown as hedge-rowed bushes. Fruits are picked as whole cymes (*pictured right*) and frozen until ready to use. A premium is paid for stem-less frozen berries. Harvest takes place from August

through September. Flowers can also be harvested around June 15 and sold fresh, or processed.

Products and Uses

Aronia~ is used to produce syrup, juice, soft spreads, and tea. The tea is usually a blend with other more flavorful ingredients including black currant. The berries are also used to make food coloring.

Elderberry~ is also used for food coloring. Both flowers and fruits are used to produce cordials, beverages, soft spreads, wine, tea, and nutraceutical products. Flowers and fruits both have a fresh market in New York and elsewhere. Fresh flowers are used to make fritters, in fruit salad (delightful star-shaped petals), and baked goods. Many folks are saying that elderberry will replace Echinaceae as a top cold and flu remedy. (*Above: Elderberry and Aronia Products; Left: Elderberry flower cluster ready to harvest*)

In Summary

Both elderberry and Aronia are gaining popularity in the US for their health benefits and quality processed products. Both plants are easy to grow, have few pests, and can have mechanical cultivation practices employed. A number of processors are looking for potential growers to make contracts. Global prices are high, and demand is expected to continue growing.

COLD ACCLIMATION IN STRAWBERRIES

Pam Fischer, Ontario Ministry of Agriculture and Food, Ontario, Canada

The process of developing tolerance to cold temperatures is called acclimation. Cold acclimation in strawberries begins when days get shorter in late summer. Short days alone will trigger strawberries to develop tolerance to -2° or -3°C. For further acclimation, plants must be subjected to cold temperatures, i.e. days of about 10°C and nights around 0°C. Photosynthesis is also required for cold acclimation to occur, so plants which are mulched before these conditions have been met will not be as winter-hardy.

Even when fully acclimated, or hardened-off for winter, strawberry plants are not as tolerant of cold temperatures as other perennial fruit crops. Cold injury to crowns appears as browning of crown tissue. Crowns will be killed at temperatures of -12°C to -14°C in the crown, but even tissue temperatures of -6°C to -9°C can lead to fewer leaves, leaf distortion, and fewer flowers and fruit. The extent of cold-temperature injury in strawberries is determined by many factors. These include the extent of cold acclimation, the cultivar, the part of the plant affected, the rate and duration of freezing, and cultural practices. Rapid freezes, when tissue temperatures drop 2 to 3 degrees per hour, are fatal. Although the duration of freeze also affects how much injury occurs, most injury occurs in the first 24 hours of damaging temperatures. Freeze / thaw freeze cycles will also cause more injury than consistently cold temperatures, if the thaw lasted more than 2 to 3 days.

Nutrient and water status of strawberry plants also affects cold acclimation. Excess or deficient nitrogen will inhibit acclimation. Optimum levels of phosphorous promote acclimation. Plants acclimated under dry conditions fare better than plants that are not slightly water-stressed.

Mulching is important to prevent cold-temperature injury. Snow is the best insulator against the cold, but snow is not consistently present throughout the winter in much of Ontario. Straw mulch, applied from mid-November to mid-December, provides good winter protection. Straw mulch also moderates soil temperatures and prevents freeze-thaw cycles that can damage plant roots and lift crowns out of the soil. Wheat straw or oat straw is good mulching material, applied at 2.5 to 3.5 tons per acre. This mulch should be applied after two or three good hard frosts, but before temperatures reach -7°C to -9°C for extended periods. Most growers apply mulch between mid-November and mid-December. The settled straw mulch should be about 2 to 3" thick. A light rain or snow after the straw is applied will help

settle the straw so it doesn't blow away.

Be sure the straw is clean, or free from weed seeds. However, do not use straw that was treated with glyphosate before harvest. We have observed glyphosate injury in the spring on several occasions, where the straw mulch was treated with glyphosate before harvest.

More straw is needed when raised beds are used. Raised beds can be 4 to 6°C colder than flat beds, but mulching overcomes most of this negative effect. Growers who grow strawberries on raised beds covered in black plastic often use a heavyweight floating row cover, such as Typar 518, instead of straw. It is reported that the combination of black plastic lined beds, with a floating row cover, provides adequate winter protection, even in colder regions of the northeastern USA.

It's a beautiful fall. With cool sunny days, cool nights, and some hard frosts, strawberry plants will be going through the process of acquiring winter hardiness. If cool weather continues, you can say good night to your strawberry plants and tuck them in with a nice warm blanket in mid-November to mid-December. If October and November are unseasonably warm, beware of applying mulch too early.

(Reprinted from: Ohio Fruit ICM News, Vol.8, No. 38, October 21, 2004)

WINTER MULCH FOR STRAWBERRIES

Sonia Schloemann, Department of Plant and Soil Sciences, West Experiment Station, University of Massachusetts, Amherst, MA

An important fall job in commercial strawberry production is mulching. Strawberries are commonly grown in cold climates, such as the northern US and Canada, but the strawberry plant itself is actually quite vulnerable to cold injury. Research has shown that, without mulch, strawberry crowns can suffer damage at temperatures below 12°F and unprotected strawberry plants can suffer desiccation damage from drying winter winds. Protective mulch can protect strawberries from cold by providing insulation, and from desiccation by providing a barrier against drying winds. Mulches will also protect plants from injury caused by soil heaving, which results from freezing/ thawing cycles during the winter. So, a key to consistent quality strawberry production in cold climates is in protecting the plants from severe temperatures or temperature swings through the practice of mulching.

Production systems can also affect the need for mulching. Plants on raised beds, for example, are more vulnerable to cold and desiccation injury than plants in level plantings, especially in locations that are exposed to strong winter winds. Annual production systems, such as fall planted plasticulture, may utilize less hardy or disease susceptible cultivars. As we will see, mulching practices must adapt to these new systems.

When should the strawberry grower plan to apply mulch? Research suggests that a good timing guide is to apply mulch after three consecutive days with a soil temperature of 40°F or below. This soil temperature usually occurs after multiple frosts, and when the plants have slowed growth in response to cooler temperatures. It is best to apply mulch before the soil freezes solid. So, in New England, mulches are usually applied in late November.

What is a good mulch material? The traditional mulching material for strawberries in New England is straw. Straws from wheat, rice, oats, or Sudan grass work well. Straws coarser than Sudan grass are not recommended. Straw should be clean, free from weed seed, and contains a minimum of grain seed. Strawberry growers can produce their own straw, often cutting the straw before the grain seed is viable. Store straw for mulching in a dry area. Occasionally, grain seedlings can become a weed problem the following spring; an application of sethoxydim will give good control.

How much mulch should be applied? A traditional, level matted row planting will require 2.5 to 3 tons of straw per acre for a 2 to 3 inch deep mulch, or about 300 small bales of average weight. Raised bed plantings and sites with strong wind may require twice this amount for adequate coverage.

How is the mulch applied? Smaller plantings may be mulched by hand by shaking out the bales of straw over the row. Larger plantings often use bale choppers to break up the straw bales and distribute the straw over the bed. Choppers are available for both small bales and large round bales.

How and when is the much remove d? In the spring, when plants begin to show growth under the winter mulch (new green tissue), the mulch should be raked off the rows to allow sunlight to penetrate and reach the foliage. Delaying

removal will delay plant growth and flowering and may reduce yield. Mulch can be raked off by hand with ordinary yard rakes in smaller plantings. In larger plantings, various mechanical tools are available ranging from modified hay rakes and tedders to equipment specifically designed for the purpose.

Floating row covers as mulch. These covers are composed of a plastic such as polypropylene, spun-bonded into a fabric that is permeable to light, air, and water. Research and growers' experiences demonstrate that these covers are useful for winter protection of strawberry plantings. While floating row covers are available in several weights, only the heavier weights are recommended for winter protection. At present a widely available weight recommended for winter strawberry protection is 1.25 oz/yd2 (42 g/m2). A variety of fabric widths are available, with common widths ranging from 15 feet to 60 feet. This material currently costs about 4 cents per square foot. With proper care, this heavier fabric should last 3-4 seasons. Floating row covers are anchored with posts, rocks, or tube sand. The edges may also be covered with soil. Floating row covers are widely used to protect annual plasticulture plantings.

Row covers are best applied on still days. Be sure to line up sufficient labor to place the row cover. If possible, use wider widths for more efficient application. The row cover edges must be anchored, as must areas where 2 covers overlap. A variety of methods are used to anchor the edges. Edges may be anchored with posts, rocks, or tube sand. The edges may also be covered with soil.

Once the mulch is in place, the job is done for the winter. Monitor the planting frequently. If the straw had blown off areas, replace at once. Watch the edges of row covers, and adjust anchors if needed. Repair any rips or holes as possible.
(Reprinted from: *Berry Notes*, Vol. 16 No.1, UMASS Amherst Extension, Nov. 1, 2004)

PRUNING BLUEBERRIES

Dr. Gary C. Pavlis, Atlantic County Agricultural Agent, Rutgers Cooperative Extension, Rutgers, NJ

Pruning continues to be little understood and poorly executed throughout the blueberry industry. In fact, it is rare to find two growers who prune the same. I would like to clear up a few misconceptions and try to outline a simple method of pruning blueberries.

The importance of pruning - Growers often feel that pruning is of little value because the effects of the practice are not immediately apparent or dramatic. It should be noted that a well-known New Jersey blueberry researcher, Phil Marucci, stated many years ago that there were a few factors that have greatly influenced the lack of increase in blueberry yield on a per acre basis over the last 30 years. Pruning was the most significant factor he cited. More recent research has revealed that young canes are more efficient fruit producers than old canes. In fact, canes that are 3 to 10 years old allocate greater than 50% of applied water and fertilizer to fruit production. By the time a cane reaches 20 years of age, only 25% is allocated to fruit. (Water and fertilizer cost the grower money and there is no profit in the production of blueberry leaves.) Additional research compared three pruning types on yield and fruit size.
Plants were 1) regularly pruned in a moderate manner such that one out of every six canes per plant were cut out, 2) heavily pruned by removing 40% of all canes out every five years and 3) not pruned at all. The result was that the regular moderate pruning gave the highest yield on the least number of canes.

Research has also shown that as pruning increases, new cane production increases. These studies show us that young canes out produce old canes, the removal of one out of six canes produces the right number of new canes and the highest yield and fruit weight is produced with regular moderate pruning. It is also important to understand how a blueberry plant grows. Each year, canes are initiated from the base of the plant. Each succeeding year, the cane produces laterals; laterals produce laterals and so on. In successive years, the lateral production on any individual cane decreases in diameter, or in other words, the wood becomes progressively twiggy. As wood becomes smaller, fruit size decreases. This is why we detail prune to increase fruit size. With this information under our belts, we can now approach how to prune.

How to prune - There are really 5 basic steps to keep in mind when approaching a bush that is to be pruned.
1.) Assess the plant's overall vigor. Is cane production adequate?
2.) Prune out all dead wood.
3.) Locate the oldest canes and prune out one out of every six canes i.e. if the plant has twelve canes, remove two of the oldest.
4.) Prune out all low branches, which will never be picked and are a source for disease.
5.) Detail prune, i.e. remove as much twiggy wood as time allows.

Armed with these basics, we can deal with the different plant situations that arise. Pruning in young plantings has the primarily objective of establishing the plant to obtain full production as soon as possible. Thus, the pruning procedure for the first two years is to remove flower buds. Some growers cut off as much as the top half of the plant. This is really quite drastic and unnecessary. Rubbing off lower buds would be sufficient, however, in a big operation it is usually less labor intensive to cut the top 3-5 inches off each cane which will remove most flower buds. Any weak twiggy growth should also be removed. In year three, a small crop is possible but should not be produced at the expense of stunting the plant. Usually 1-2 pints/bush is optimum and fruit should only be on strong wood. The fourth and fifth year twiggy growth must again be removed as well as any lateral canes that have developed. Fruit production can be increased but the amount is dependent on the number of new canes that were produced the preceding years, 3-5 canes/yr. is optimum. The blueberry planting should be in full production by the sixth year though there are numerous variables which will influence this timing, the most important of these being proper pH and nutrition, water management, and the crop to cane production balance.

Pruning based on plant status vs. variety - I have found it helpful to growers to discuss blueberry pruning strategies based on plant status. I do not believe there is a strategy for each variety though any one variety may fall into one of the following categories most of the time. For example, the variety Blueray often has a spreading or open habit in which canes tend to bend down to the ground. Plants of this type must be thinned to the 1 of 6 rule; however, canes that are bent over also tend to produce an upright shoot. These canes should be pruned just above this upright shoot to produce a more erect plant. Other varieties that often fit into this category are Berkeley, Bluetta, Coville, Weymouth and Patriot.

Varieties such as Bluecrop, Collins, Darrow, Earliblue, Herbert, Jersey, Lateblue and Elliot often fall into the erect plant category. These plants become overly dense in the center, decreasing fruit bud initiation. The pruning strategy for this category is to remove older central canes before all others.

When plants are overly vigorous, the primary strategy is to remove entire canes rather than spend time on detail pruning. This is done at least until the proper fruit to cane production balance can be established through nutrition and fruit production management. Varieties that are prone to this situation are Earliblue, Collins, Blueray, Herbert and Collins though any variety can potentially be overly vigorous. Weak plants are treated in the opposite manner. The primary procedure is to detail prune rather than using whole cane elimination. Varieties that are classically put into this category are Weymouth and Bluetta.

Rejuvenation pruning - I should take a moment to address the method of pruning on a field that has been neglected for a long time and needs to be rejuvenated. This question often comes up when a grower has purchased an older field. The most important step is to inspect the plants for virus symptoms. Any plant showing these symptoms should be pulled out. These plant inspections must be done during the growing season because symptoms are most easily seen on the leaves. The next step is to completely prune everything down to the ground. A chain saw is the quickest and easiest method. This pruning is best done in late winter. An application of a 10-10-10 fertilizer should be made in early April, usually at a rate of 400 lbs. per acre. No crop will be harvested that year. The following winter the canes should be thinned to approximately 12-16 canes per plant. A full crop may be harvested the second year.

In summary - Pruning correctly can 1) increase yield by producing more young canes, 2) increase fruit size by producing more strong wood, 3) decrease disease by removing dead wood and, 4) increase cane initiation because as pruning increases, cane number increases. Pruning costs money, but it will cost a grower more in the long run if it isn't done at all or isn't done correctly.

(Reprinted from: The Blueberry Bulletin, September 15, 2004,Vol. XX, No. 21, Rutgers Cooperative Extension, with some modifications)

BLUEBERRY MULCHING

George Perry, Extension Educator, Schuylkill Count y Cooperative Extension, Penn State University, Pottsville, PA

Mulch plays a very important role in blueberry production in Pennsylvania. The Highbush blueberry plant is grown on upland soils in most locations of Pennsylvania. Highbush blueberry is naturally adapted to a lowland, acid soil so amendments must be made to the soil for a successful planting on upland locations. Highbush blueberry roots thrive in an open, porous soil that is high in organic matter, well drained, and supplied with adequate moisture. Blueberry roots are in the upper 18 inches of the soil. Upland soils are generally drier, higher pH and lower organic content than lowland soils. It is important to maintain constant moisture content near the surface of the soil and optimum soil acidity. One of the most successful ways to do this is using mulch.

Annual mulching has been found to reduce weed growth, lower soil temperatures in summer, help maintain uniform soil moisture and develop a better soil structure, prevent heaving and subsequent root injury, control soil erosion and reduce the costs of cultivation. The following research material is from *Blueberry Science* by Paul Eck. The favored mulching material is sawdust, preferable a well composted softwood sawdust (Moore and Pavlis, 1979). Pine bark is also excellent and compacts less than sawdust. Four to six inches of mulch are needed initially, with annual additions of one inch of sawdust to maintain the depth. If fresh sawdust is used, an additional 50 to 100 percent N may be necessary for the first few years to compensate for increased microbial activity. Well-composted sawdust requires less supplemental nitrogen. Other organic materials that have been used, not as effective as sawdust, include corncobs, straw and leaves. Manure and stable bedding must be well composted before they are safe to use and even than are not as desirable as sawdust since they may increase soil pH.

In a long term experiment on a commercial Highbush blueberry planting in Arkansas, (Moore and Pavlis, 1979) found that plants continuously mulched with sawdust outyielded plants mulched only for the first year, first two years, or first three years after planting. They also observed that straw mulch was effective, but deteriorated more rapidly than sawdust. The incorporation of peat moss in the soil at planting also resulted in higher yields in following years. In addition to its use as mulch, composted sawdust has been found beneficial when applied in the planting hole, particularly in conjunction with the mulch (Brooks, 1972). In these studies fertilizer applications had to be increased threefold to produce vigorous growth. (Cummings, 1981) was able to overcome the harmful effects of high pH by incorporating sawdust into the soil in which Rabbiteye blueberries were grown.

Black plastic has been successfully used as a mulching material in establishing plantings (Bell and Kroon, 1979). Care must be taken when fertilizing under black plastic since fertilizer placed close to the plant crown can cause severe burning. It is probably preferable to work the required fertilizer into the soil before laying the plastic. (Mainland and Lilly, 1984) concluded that black plastic mulch offers a practical earlier age. They found that a single application of 925 Kg/ha of a 10-10- 10 fertilizer incorporated into the soil before laying the plastic provided adequate nutrition for two years, the effective life of the plastic.

The Extension agent in Southeast Pennsylvania conducted a blueberry mulch research plot over five years. The plot was replicated three times with three mulches: corn cobs, wood chips and sawdust. The plot had four cultivars: Bluejay, Bluecrop, Patriot and Spartan. After five years it was determined there was no significant yield difference. The best mulch of the three is the one you can obtain at the lowest cost. Remember sawdust or wood chips from red maple and beech should not be used. Sawdust or wood chips from those two trees may injure or retard blueberry plant growth.
(*Source: Vegetable & Small Fruit Gazette, Vol. 7, No. 5, May 2003*)

A PICTURE IS WORTH A THOUSAND WORDS, PART IV: CURRANTS AND GOOSEBERRIES

Cathy Heidenreich, Plant Pathology, NYSAES Cornell University, Geneva, NY

This is the fourth and last in a series of articles spotlighting websites that provide excellent pictures of small fruit diseases, pests, and disorders. This month we are focusing on *Ribes* web sites. And for currants and gooseberries, it is one stop shopping! The Ribes Diagnostic Tool is a very well developed and easy to use site by Kim Hummer and Joseph Postman, USDA-ARS, National Clonal Germplasm Repository, Corvallis, Oregon. This site features a diagnostic key based on symptoms leading to photographs and descriptions of each cause, along with links to other information. Biotic, abiotic diseases and insect damage are all included in this key. Happy viewing!

SMALL FRUIT REFERENCE LIBRARY REVIEWS

Cathy Heidenreich, Plant Pathology, NYSAES Cornell University, Geneva, NY

As we previously discussed, a reference library can be an invaluable asset, saving both time and money for the small fruit grower (See full article in last month's issue of NYBN). Careful planning and selection of materials for your reference library can provide you with a broad knowledge base that is timely and in some respects, timeless. In this month's NYBN issue, we have included reviews of more potential additions to your collection.

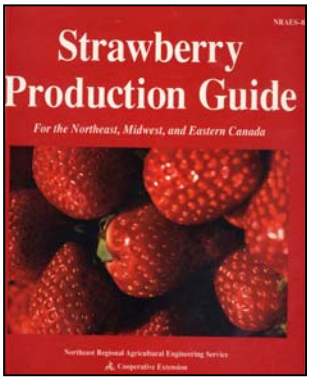
CD Review: *1000 Weeds of North America CD-ROM*

The most comprehensive weed identification reference ever assembled for North America, this CD contains images of 140 grass-like weeds and 860 broadleaf weeds as well as an interactive key for identifying unknown weeds. The powerful program is interactive and includes descriptions of attributes for each species.

The CD-ROM will be useful to scientists, practitioners, teachers, and students as a complement/supplement to other taxonomic CD-ROMS or books for plant identification, weed management courses, or workshops on plant management in North America.

System requirements: Windows 95 or higher, Internet Explorer 5.0 or higher (free download), and 700 megabytes of free space on your hard drive. The CD can also run from the CD drive without installation. This product is available from APS Press at: http://www.shopapspress.org/10weofnoamcd.html

Book Review: *The Strawberry Production Guide*



If you are a strawberry grower or an advisor to growers, you won't want to miss the **Strawberry Production Guide for the Northeast, Midwest, and Eastern Canada, NRAES-88**, a publication from the Natural Resource, Agriculture, and Engineering Service (NRAES). It is the most comprehensive production guide ever produced for strawberry growers. The guide focuses on production practices popular in northeastern North America, but it contains pertinent information for anyone involved in growing berries.

The Strawberry Production Guide is 162 pages long and contains 14 chapters, 37 figures, 47 tables, and 115 full-color photographs. It provides up-to-date, in-depth coverage of every aspect of strawberry culture -- from preparing the production site to harvesting and marketing. It is sure to be a valuable resource for both experienced and novice growers. The guide comes in a three-ring binder.

Chapter 1 traces the history of the modern cultivated strawberry and provides a detailed discussion of the structure and development of the plant and the development of flower clusters and fruit. Chapters 2 through 4 focus on the basics of production: site selection and preparation, plant selection, and production systems. Site preparation procedures such as eradicating weeds and checking soil nutrient levels are covered, and seventeen preplant cover crops are described in detail. The plant selection chapter points out factors to consider when selecting from the smorgasbord of available varieties; 34 popular varieties are rated for important characteristics such as flavor, yield, berry size, and disease resistance. Production systems discussed include matted rows, ribbon rows, waiting beds, annual plasticulture, day neutral production, and protected cultivation. Organic production is reviewed as well.

Chapters 5 through 7 cover the management of temperature, water, and nutrients. Several strategies for temperature regulation are presented. Two types of irrigation systems, trickle and overhead, are compared, and several methods for determining when and how long to irrigate are discussed. The nutrient management chapter covers the basics and goes into detail about specific soil amendments and nutrients.

The management of troublesome pests, diseases, physiological disorders, and weeds is reviewed in chapters 8 through 10. Many of the color photographs in the book will help readers identify pests and symptoms of diseases and disorders. Several strategies are offered for weed control before and after planting, either with or without chemicals.

Spray equipment for applying crop protectants and nutrients is reviewed in chapter 11. Several types of sprayer nozzles are discussed at length. Methods for calibrating powered and hand-held sprayers are also covered. Chapters 12 and 13 give tips for harvesting, handling, transporting, and marketing fresh fruit. Marketing value-added products such as jelly and wine and setting a fair price for berries are topics discussed in the marketing chapter.

The final chapter, budgeting, guides readers through sample budgets that reflect typical costs as well as costs that many growers overlook. The budget spreadsheets used in the chapter are provided on a floppy disk included with the book at no extra cost. Growers can adjust the values in the spreadsheets to reflect their actual costs, and the program will automatically calculate the resulting effect on total costs and profits. Microsoft Excel, version 4.0 or higher, or a compatible spreadsheet program is required to access the spreadsheets.

The book also features a key to common strawberry pests and problems, a glossary, a table of conversion factors, and information about membership in the North American Strawberry Growers Association.

Sixteen experts representing eight universities wrote the guide. It was edited by Marvin Pritts, a horticulturist with the Department of Fruit and Vegetable Science at Cornell University, and David Handley, an extension horticulturist with the University of Maine at Highmoor Farm.

The Strawberry Production Guide for the Northeast, Midwest, and Eastern Canada, NRAES-88, is available for $45.00 per copy (plus shipping and handling) from NRAES, Cooperative Extension, PO Box 4557, Ithaca, New York 14852-4557.

Check out the NYSAES Tree Fruit and Berry Pathology web site at:
www.nysaes.cornell.edu/pp/extension/tfabp

Questions or Comments about the New York Berry News?

Send inquiries to:
Ms. Cathy Heidenreich
New York Berry News, Interim Editor
Department of Plant Pathology
New York State Agricultural Experiment Station
690 W. North Street
Geneva, NY 14456

OR *Email*: mcm4@cornell.edu

(***Editor's Note***: Weather data for November/December will appear in the January Issue)