New York Berry News

CORNELL UNIVERSITY

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What's Inside

This is the last NYBN issue for 2004. Best wishes for very happy and healthy holiday season from all of us at The New York State Agricultural Experiment Station, Cornell University, Geneva Campus. Our next issue will be Vol. 4 No.1 in January 2005.

This is the time of year for planning next year's plantings and ordering plants. Looking for the tried and true as well as the new and promising berry cultivars for 2005? Check out the 2003 cultivar review by Courtney Weber in the NYBN November 2003 issue . Reviews of newer cultivars will be included in forthcoming issues of NYBN. If you are looking for sources of particular cultivars, a good source of information for locating nurseries that carry certain cultivars is the Cornell Nursery Selection Guide. This Guide is updated regularly and lists most commercial cultivars of all the berry types and cross references them to a nursery supplier so you can find the nurseries that carry the cultivars listed. The guide is available on-line at www.hort.cornell.edu/extension/commercial/fruit/Berries/nurseries/index.html.

Things to look for in this month's issue include highlights of the NASGA Summer tour to Quebec, by Pam Fisher, an article on berry crops in Cornell's Forest Farming project by Lori Bushway, our newest alternative "berry" crop article on hardy kiwi by Lee Reich, and a "mini symposium" on organic berry production with selected articles by Elsa Sanchez and Kathy Demchak of Penn State University. Lastly, we have a review of another potential addition to your small fruit reference library. Happy New Year!

UPCOMING MEETINGS

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

BERRY CROPS IN CORNELL'S FOREST FARMING PROJECT

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

Most farms in the Northeast include wooded areas that exist either as woodlots, plantations, or fence rows. However, the degree to which these areas support a particular farm is highly variable - some being largely ignored, others contributing significantly to the farm's economic well being.

One possibility for farmers looking for alternatives to traditional farming and forestry practices is the greater integration of trees directly into the farming system through the adoption of various agroforestry principles and practices.

Forest farming is a specific agroforestry system that involves planting profitable, shade-tolerant species within an established forest to produce a variety of non-timber forest products such as food, medicinal herbs, ornamentals, or craft materials.

Characteristically, forest farms are relatively small in area but spatially complex. They take advantage of multiple layers within the vertical profile of the forest. In addition to shade, the upper canopy (overstory) of mature trees may provide nuts and fruits. The middle layer may include small trees and woody shrubs, like pawpaws, blueberries and brambles. The understory can support herbaceous perennials, like the medicinal herb ginseng.

Though forest farming offers many opportunities for supplemental income, adoption in the Northeast has been limited. New research efforts at Cornell's MacDaniels Nut Grove could help develop the principles and practices research base needed to advance the implementation of forest farming in the Northeast.

In 2002 researchers and students began renovating a long neglected woodlot located in the Cornell Plantations Upper Cascadilla Natural Area. The 5-acre site, originally planted in the 1930s is being developed as a forest farming and agroforestry research and education center. Initial research efforts include the establishment of three berry crop studies:

- Shade-tolerance of the five fruit species
  - Chokeberry (*Aronia melanocarpa*)
  - Blueberry (*Vaccinium* sp.)
  - Gooseberry (*Ribes grossulariae*)
  - Red currant (*Ribes sativum*)
  - Honeyberry (*Lonicera kamchatka*)
- Purple raspberry and black raspberry cultivation under black walnuts trees
- Elderberry production in forest understory

The MacDaniels Nut Grove is open to the public year round. Visit the website http://www.hort.cornell.edu/mng/index.html for more information about public guided tours and this forest farming and agroforestry research and education center.

For more information about forest farming see:
http://www.hort.cornell.edu/mng/index.html
http://www.cce.cornell.edu/scnyag/forestfarming/index.htm

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

HIGHLIGHTS OF THE NORTH AMERICAN STRAWBERRY GROWERS SUMMER TOUR: QUEBEC

Pam Fisher, Berry Crop Specialist, Ontario Ministry of Agriculture and Food, Ontario Canada

About 80 growers, plant propagators, researchers, provincial and industry specialists from North America attended this 2-day tour. We visited 11 farms and markets, showcasing production of strawberry plants, blueberries, day neutral strawberries, black currants, sea buckthorn, plasticulture berry production, and on-farm marketing. All the sites were an easy drive from Quebec city, and included the scenic Ile d'Orleans. The tour was organized by Luc Urbain, Berry Crop Specialist, for the Ministry of Agriculture and Fisheries in Quebec, MAPAQ. Highlights of the tour were many. A few are included here:

Black currant production: Hand harvest for this small planting (less than 10 acres) once took over 30 people. Now, a machine (BRAUD 2720) can harvest 2000-3000 lbs/day. Black currants are not hard to grow here, it is easy to grow more than are needed for value-added markets. Black currants are well suited to the climate on Ile d'Orleans, which has warm, but not hot summers, and cold winters. Black currants bloom early and are very susceptible to spring frosts. Here the crop is protected from spring frosts by the sloping elevation and the moderating effect of the St. Lawrence River on the climate. (Figure 1)

Figure 1: Self propelled Braud 2720 harvester, for black currant harvest. Features pulsating arms, conveyer cups, and 4 aspirators to remove leaves and crop debris. (Value $150,000 new).

Strawberries: Some growers have successfully adapted plasticulture for June bearing strawberry production (Figure 2). Components of the plasticulture system include:

- Raised beds, sub surface drip irrigation, black plastic mulch
- Double row, high density planting, 16-22,000 plants/acre
- A small crop is harvested in the year of planting (4-5000 lbs/acre)
- Larger crop of high quality fruit is harvested the following year (8000-15000 lb/acre).
- A hand planting tool is used to set dormant bare root plants through the plastic, a mechanical planter is being tested for plug plants. (Figure 3).

The growers we visited favored Darselect strawberry (June bearing), for its good flavor, and very high yields in plasticulture systems. The quality is also good, although susceptibility to leaf disease is extreme. Jewel and Cabot are also popular June-bearing varieties for plasticulture.

About 250 acres of day neutral strawberries are grown in Quebec (Ontario has less than 100). The success of this production system is due to the moderate summer temperatures (Seascape will stop blooming if it's too hot in summer) and the proximity to markets. (Figure 4)

Figure 2: June bearing strawberries in plasticulture system.

Figure 3: Planter for strawberry plant plugs.

For both day-neutral and June bearing varieties, growers are experimenting with different plant types for establishing the planting. In addition to the traditional "frigo" plant (bare root, dormant, cold stored), Grade A plants, or even A+ plants (with larger crown size) are used on a small scale to increase early production. Another experimental option is plug plants, for establishing both day neutral and June bearing varieties in the late summer. Three plant nurseries in Quebec are providing limited quantities of plug plants in August for late summer plasticulture planting. (Figure 5)

Where plug plants are planted in late summer, a row cover is used in October to help promote flower bud initiation and plant establishment.

Figure 4: Day neutral strawberries "Seascape"

Figure 5: Plug plants ready for planting

Seabuckthorn: Helene Rousseau is a researcher with the Institute de Recherche et de Developpement en Agroenvironnement (IRDA). She is studying Seabuckthorn, as potential new crop with nutraceutical uses. (Figure 6) Objectives of her research include

- Find a suitable thornless cultivar for mechanical harvesting
- Evaluate different harvesting techniques
- Determine better cultivars for yield, fruit quality, oil production, and pest resistance.

There is no convenient method for harvesting this crop at present.
Sea Buckthorn berries are difficult to harvest. One method is to cut off entire branches, and freeze them until berries drop off (Figure 6, right).

Blueberries: The highbush blueberry industry is growing in Quebec. In spite of the cold climate, the plantings overwinter successfully under a consistent snow cover. Although the soil pH is naturally low in much of Quebec, peat moss and elemental sulfur are used to amend the planting site. The peat moss is incorporated the fall before planting, so that is thoroughly wet at planting time. Wood chip mulch is used after planting, to moderate soil temperatures and moisture. Growers use snowplows to pile additional snow on top of bushes, to prevent winter injury. Branches are killed above the snowline during cold winters (i.e. 2002-2003), and plant size remains small compared to plants in southern Ontario. (Figure 7)

- "Reeka" looks promising, although its branching habit may be too high.
- "Duke" is very productive.
- "Patriot", propagated from tissue culture, is too vigorous, bare root cuttings are preferred for this variety.

Figure 7: Established highbush blueberry planting: plants are relatively short due to winter injury above the snow level. Fertigation through trickle irrigation systems is working well. Half of the recommended N is applied broadcast in early spring, the rest is applied by fertigation, over 8-10 weeks.

Value-added marketing: Several interesting new products (black currant sorbet, raspberry cookie) were being marketed successfully at farm markets. Fresh raspberries, blueberries, and strawberries were marketed together, in an assortment of

container sizes, making it difficult for the customer to compare prices (Figure 8). A ½ liter basket was popular for raspberries.

Figure 8: An assortment of berries in 6 x 1/2 pt containers, for $10. Using containers of different sizes makes it hard to compare prices at different markets/stores.

Raspberries: The fall bearing variety "Pathfinder" was apparently productive (6500 kg/ha this year) and 2 weeks earlier than Autumn Britten in Quebec. The short shelf life for this variety (less than 12 hrs) limits sales to local retail or roadside market only! (Pathfinder is not common in Ontario. Apparently it is an early ripening primocane fruiting type for short season, described as having short canes, moderate vigor, and medium sized fruit with poor flavor. It is a cross between August Red and *R. strigosus*. August Red was from New Hampshire.)

Conclusion: If you are not a member of the North American Strawberry Growers Association, look them up, and consider joining. NASGA holds a winter meeting and a summer tour each year. The opportunity to see berry production in other parts of North America, and to meet and share ideas with innovative growers, is priceless. *(Reprinted from: The Ontario Berry Grower, Vol. 7, November 2004)*

HARDY KIWIFRUIT: EMERALD GEMS

Article by Lee Reich, PhD., Garden and Orchard consultant, Illustrations by Vicki Herzfeld Arlein.

Look at hardy kiwifruit plants and it is easy to see why, although introduced as ornamentals about a century ago, they have not been longer and more widely grown also for their fruits. The fruits of these cold-hardy cousins to the fuzzy, supermarket kiwifruit are smooth and green, so have usually gone unnoticed beneath the foliage. It is only the past two decades that the fruits have begun to be appreciated for themselves, but one taste would have rescued them from obscurity sooner. The fruit are grape-size, borne in clusters, and can be eaten just like grapes, skin and all. They have the same sparkling, emerald-green flesh and similar flavor to supermarket kiwifruits, except that hardy kiwifruits are much sweeter and more flavorful.

The great market potential of hardy kiwifruit comes not only from its delectable flavor and convenience in eating, but also because this new fruit can ride on the established marketing coattails of the fuzzy kiwifruit. Fruit from commercial and experimental test plantings have fetched high prices and enthusiastic consumer reaction. Hardy kiwifruit have no significant pest problems, so also are well suited to “organic” or “sustainable” production and marketing.

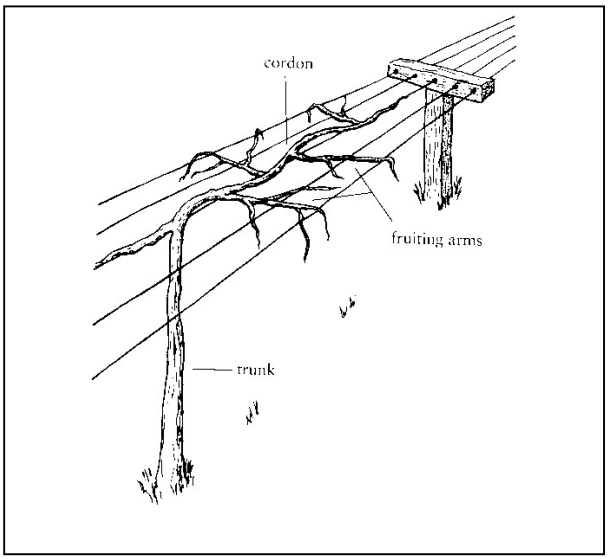
Plant Description

In their native habitats within or along the margins of humid mountain forests in eastern Asia, the twining vines clamber up trees or sprawl over the ground. Hardy kiwifruits are represented by a number of species, but the two most prominent are *Actinidia arguta* and *A. kolomikta*, hardy to U.S.D.A. Zones 4 and 3, respectively. *A. arguta* needs about 150 frost-free days to ripen its fruit; *A. kolomikta* needs about 130 days. Of the two species, *A. arguta* is more vigorous and prolific. Other major differences between the two species are that *A. kolomikta* fruit are smaller and ripen earlier than those of *A. arguta*, and they sometimes drop when ripe.

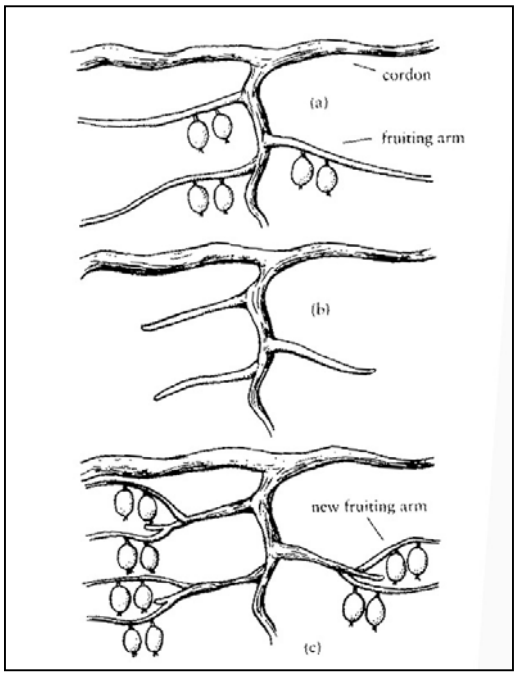
A number of varieties of both species are available. ‘Anna’ (a Russian selection whose full name is ‘Ananasnaja’) is very reliable, although it just barely ripens in northern areas. ‘Issai’, from Japan, ripens similarly and is somewhat self-fertile but not very cold hardy. Very tasty and earlier ripening are ‘Geneva’, ‘MSU’ (‘Michigan State University’), and ‘Dumbarton Oaks’ (all three propagated from old ornamental vines in the U.S.), and *A. kolomikta* varieties such as ‘September Sun’ and ‘Krupnopladnaya’.

Cultivation

Plant the largest vines available, allowing one (nonfruiting) male per eight (fruiting) females. Soil drainage must be perfect. The vines are best supported on a T-trellis that is about six feet high and wide, with 3-5 wires strung between the arms of the T. Space posts sixteen feet apart, with plants at half that distance.



The goals in training and pruning are to make a potentially tangled mass of rampant shoots manageable and easy to harvest, and to keep stems bathed in enough light to remain fruitful. Pruning also stimulates new growth, important because fruits are borne only toward the bases of new shoots that grow from one-year-old canes (similar to grapes).



An established vine consists of a trunk, permanent cordons, and fruiting arms. Train young plants to a single trunk up to the middle wire of the trellis, then train two horizontal cordons, running in opposite directions along that wire. Temporary fruiting arms, perpendicular to the wires, grow off the cordons.

Hardy kiwifruit vines require pruning in both winter and summer. In winter, cut back fruiting arms to within 18 inches of where growth began the previous season. Whenever a fruiting arm becomes too old and begins to originate too far from the cordon, renew it by cutting it almost back to the cordon. Go over the vines in summer and cut back any rampant stems as well as those that are tangled. Prune male vines drastically right after they finish flowering.

Pitfalls to Avoid

Although hardy kiwifruits are, as their name implies, cold hardy, this cold-hardiness comes only with age; young plants commonly freeze back, delaying production. For this reason, plant large vines and protect the developing trunks from winter sun and cold with 'Tree-Shelters', corn stalks, burlap, pipe insulation, or tree wrap material. Remember, the trunks of hardy kiwifruits are rarely exposed to full sunlight in the wild.

Hardy kiwifruits are remarkably pest free plants. The greatest hazard is from crown rot. Avoid this disease by planting in well-drained soil or atop mounds.

Hardy kiwifruits ripen unevenly, and vine ripened fruits are easily damaged. Firm, nearly ripe fruits handle better, and can be refrigerated and ripened in "clamshell" containers that maintain high humidity. For good storage, harvest whole clusters of fruit when they are slightly under ripe, as indicated by the first fruits softening or by a refractometer reading of 10 to 14 degrees Brix. Under optimum conditions, yields of 23 tons/A, or about 200 pounds per vine, can be expected. Picked soft, with their stems attached, hardy kiwifruits keep for a couple of weeks; firm, they'll keep up to two months.

The Future

Interest in hardy kiwifruits continues to mount, setting breeders to work. Besides the usual goals of increased productivity and flavor, development of self-fertile varieties would eliminate the need for male pollinators. The variety 'Issai' is somewhat self-fertile, but this variety is not very cold hardy, the fruit ripens very late, and a male pollinator, in fact, does increase fruit size and production.

Watch for red hardy kiwifruits. The variety 'Ken's Red' is now available, with a mild flavor and questionable hardiness. Others are sure to follow.

Perhaps the greatest limitation to this wonderful fruit is its name. Something more euphonious than "hardy kiwifruit" is perhaps needed. Perhaps foreign names for this fruit -- *van zhou, tara,* or *kishmish*, for example -- would be more appealing. "Grape kiwi" has been suggested, as has "Baby Kiwi" and "Wee-ki". "Kuwi" anyone?

Nicknames aside, pest resistance and delectable flavor make hardy kiwifruits an uncommon fruit to grow and sell.

Further reading
Uncommon Fruits for Every Garden, by Lee Reich, Timber Press, 2004, $24.95.

(Editor's note: A review of this book follows in the Small Fruit Reference Library article below. The book can be ordered directly from the author by sending a check for $28 (which includes postage and tax) to: Lee Reich, 387 Springtown Road, New Paltz, NY 12561.*)*

EIGHT TIPS FOR TRANSITIONING TO ORGANIC PRODUCTION

Elsa Sanchez, Assistant Professor, Horticulture Systems Management, Penn State University

The transition phase can be difficult for growers transitioning to organic production. During the transition phase the farming system is undergoing many changes in physical, chemical and biological properties. The transition phase is typically accompanied by reduced yields until the farming system reaches a new equilibrium. Further, crops produced during the transition phase cannot be marketed as organic or transition organic. As a result growers must be prepared to operate with the reduced incomes typically accompanied with reduced yields during the transition phase. Below are some tips for the transition phase adapted from Zinati (2002). Keep in mind that factors such as location, soil type, pest pressure and environmental factors can affect the efficacy and implementation of these tips.

1. Select land with a high nutrient status, good soil structure and low pest pressure to transition first. A grower can transition separate fields at different times to organic production. A strategy for transitioning fields, particularly with high pest pressures may be to use a pre-transition phase (See tip 8).

2. Include legumes in the crop rotation to supply nitrogen to the soil and reduce pest pressure. Different legumes add different amounts of nitrogen to the soil. The Commercial Production Recommendations Guide for Pennsylvania includes a table with nitrogen values for different legumes used as green manures. Even when the legume is grown as a cash crop, incorporating the plant reside after harvest can add some nitrogen to the soil.

3. Start the transition by planting a crop with low nitrogen needs. This strategy will provide more time for adding nitrogen to the soil using other fertility management tools including green manures, manures and compost.

4. Use green manures, manures and compost to increase soil organic matter, water infiltration and reduce soil erosion. Green manures, manures and compost are already important tools for fertility management in organic systems.

5. Alternate cool season crops with warm season crops to break weed cycles. In surveys of organic growers, weeds typically are listed as the biggest pest problem in organic production. This is one strategy for their management.

6. Use timely disking and over-seeding as other strategies to manage weeds.

7. Experiment on a small-scale before adopting a pest management strategy on a large scale. This can reduce risks in the event the pest management strategy fails.

8. While a 3-year transition phase is required for certification, a pre-transition phase may help alleviate decreased yields during the transition phase. A pre-transition phase may be useful for fields with high pest pressure. During a pre-transition phase conventional pest management tactics are used along with organic tactics to reduce pest pressures. Once pest pressures are reduced organic pest management tactics are used exclusively.

Reference*s*
Zinati, G.M. 2002. Transition from conventional to organic farming systems: 1. Challenges, recommendations and guidelines for pest management. HortTechnology 12:606-610.

(Reprinted from: Vegetable and Small Fruit Gazette, Vol. 8 No. 2, February 2004.)

THE ORGANIC WAY- USE OF COMPOST AND MANURE IN SMALL FRUIT PRODUCTION

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Compost

Compost can be an important part of small fruit nutrient management. In addition to adding nutrients to the soil, compost can improve long-term soil health. Composts are best when used in combination with other nutrient management strategies including raw manures, green manures, fertilizers and crop rotations. According to the National Organic Standard, compost can applied as necessary provided the compost meets carbon to nitrogen (C:N) and temperature requirements and has not been treated with prohibited substances. When using compost it must have a C:N ratio between 25:1 and 40:1. In addition, when using an in-vessel or static aerated pile system for composting the pile must reach a temperature between 131°F and 170°F for a minimum of three days. If using a windrow system for composting, the pile temperature must be maintained between 131°F and 170°F for a minimum of 15 days and turned a minimum of five times during that time. A compost log should be used to document that the composting procedure meets protocol. If the compost used is purchased, it must also have been produced in adherence with these requirements.

The nutrient content in compost varies depending on source materials and composting protocols used; therefore, it is recommended that compost be tested to determine the amount of nutrients it contains (kits are available through local county Extension offices). Finished compost typically has 0.5 to 2.5 percent total nitrogen. Most of the nitrogen is in an organic or slow release form. As a general rule, about 10% of the organic nitrogen in the compost will be available to the plant per year. This percentage is referred to as the availability coefficient. Phosphorus in composts, like nitrogen, is in an organic form that is not immediately available for plant use. As phosphorus is changed to a form useable by plants, some of it binds to soil particles and is again unavailable for plant use. Because of this, compost generally contains very little phosphorus for plant use and phosphorus from alternate sources is typically needed to meet plant requirements. Potassium in composts is in a form that is readily available for plant use, but it is also water-soluble and therefore can leach out of compost piles. Placing a cover over a compost pile can help reduce the amount on potassium lost to leaching. In addition to determining the nutrient content of compost, it can be useful to determine the pH because it can be unsuitably high for small fruit production, particularly for blueberries, which grow optimally in low pH soils.

When using composts, it is best to apply it based on crop needs rather than on a depth basis for long-term soil health. Studies have shown that this is especially the case when growing in high tunnels. The environment within high tunnels excludes factors that assist in the breakdown of compost (for example, rain). Applying compost on a depth basis in high tunnels can increase soil nutrient and soluble salts to well above optimum levels and compromise yields. Compost can be applied based on the amount of nitrogen, phosphorus or potassium the crop needs. Most commonly compost is applied based on the nitrogen requirements of the crop because nitrogen most often is limiting for plant growth.

To calculate how much compost to apply based on the nitrogen needs of a crop, first determine the total amount of nitrogen contained in the compost. Generally this is given in units of pounds per ton or as a percent. If total nitrogen is given as a percent, multiply this number by 20 (2000 lb/ton X 0.01 to change the number from a percent to a proportion) to determine the pounds of nitrogen per ton of compost. Next, determine the availability of the nitrogen in the compost. A general rule is 10% of the organic nitrogen will be made available to the plants in the first year. Finally, determine the amount of nitrogen needed by the crop. Remember to subtract nitrogen added from other sources (e.g., green manures or fertilizers) from the amount of nitrogen needed by the crop. To calculate the application rate of the compost, multiply the total amount of nitrogen in the compost by the availability coefficient of the nitrogen. Then divide that number by the amount of nitrogen needed by the crop.

For example, a compost has 1.1% total nitrogen on a wet weight basis and analysis has indicated that a June-bearing strawberry planting needs 30 pounds of nitrogen per acre.

Step 1: Convert the 1.1% total nitrogen to units of pounds per ton by multiplying 1.1% by 20. The result is 22 pounds of nitrogen are contained per ton of compost.

Step 2: Determine how much nitrogen will be made available to the plant and multiply it by the amount of total nitrogen in the compost. The result is 2.2 pounds of nitrogen per ton (22 pounds per ton X 10%).

Step 3: Determine how much nitrogen needs to be applied to meet the needs of the crop and divide it by the amount of nitrogen available from the compost. The result is 13.66 tons per acre (30 pounds of nitrogen needed per acre ÷ 2.2 pounds of nitrogen per ton) of compost needs to be applied to supply the plants with 30 pounds of nitrogen per acre. Timing the application of compost is different than for adding chemical fertilizers because nutrients are generally slowly made available to plants. When applying compost, timing must be adjusted to account for decomposition and the

subsequent release of nutrients. For example, June-bearing strawberries have a high nutrient demand in the fall as they produce flower buds for the crop the following season. Compost may need to be applied in the summer so it will have sufficient time to decompose and release nutrients in time to meet plant needs in the fall. Applying compost at improper times can result in vigorous plant growth late in the season. This delays hardening off of the plants and can lead to winter injury. Additionally, when compost is applied to raspberry plantings, use a fine compost because primocanes have difficulty emerging through large clumps.

Raw Manures

As with composts, raw manures can be used as a part of a nutrient management system. They also are best when used in combination with other nutrient management strategies. However, for reasons outlined below, manures are better suited for use during soil preparation prior to planting small fruit crops rather than after the crop has been planted. Composted manures are a better option for application after the small fruit crop has been planted.

According to the National Organic Standard, raw animal manures can be used anytime when needed on fields planted with crops not intended for human consumption, such as on green manures or cover crops. When raw manures are used on fields that are planted in crops for human consumption with the edible part of the crop not in contact with the soil (e.g., trellised brambles, highbush blueberries, gooseberries, currants), the manure must be soil incorporated a minimum of 90 days before harvest. When raw manures are used on fields that are planted in a crop for human consumption with the edible part of the crop in contact with the soil (e.g., strawberries), the manure must be soil incorporated a minimum of 120 days before harvest. The use of sewage sludge is prohibited in certified organic production. Even non-organic growers should be aware that there are site- and crop-specific restrictions that limit sewage sludge application to cropland, as outlined in state (and possibly local) regulations.

Tables listing the nutrient contents of different manures are available, however nutrient content varies depending on several factors including the feed the source animal was provided, presence of bedding in the manure and manure handling. Also, nutrient availability decreases as the manure ages. Therefore, as with composts, it is recommended that manures be tested for their nutrient content. Manure is typically applied based on the nitrogen needs of the crop. Fact sheets are available through cooperative Extension with detailed calculations for determining application rates for manures (for example, Estimating Manure Application Rates, Penn State Publication CAT UC151).

Nitrogen contained in manures is in the form of ammonia or ammonium, which can be quickly lost, through volatilization, to the atmosphere. To avoid this nitrogen loss, raw manures are soil incorporated. Soil incorporating manures can be a challenge for small fruit crops because the plants are perennial and have shallow root systems that can be damaged during incorporation. Applying manures to the small fruit crop can also damage the plants because of potentially high nitrogen and salt levels in manure. Additionally, manures can be contaminated with human disease causing organisms, which can be transferred to fruit. Manures can also have high weed seed levels, which can complicate production. It has been documented on vegetable crops that as manures decompose they can release compounds which when taken up by plants can lead to vegetables with off-flavors and odors. This may or may not be the case for small fruit crops. However, for these reasons, manures are recommended for use during soil preparation prior to planting small fruit crops rather than after the crop has been planted

(Reprinted from: Vegetable and Small Fruit Gazette, Vol. 8 No. 10, October 2004.)

THE ORGANIC WAY- PREVENTATIVE DISEASE MANAGEMENT FOR HIGHBUSH BLUEBERRIES

Elsa Sanchez, Assistant Professor, Horticulture Systems Management, and Kathy Demchak, Senior Extension Associate, Small Fruits
Penn State University

The first step in preventative management of blueberry diseases is to become familiarized with the diseases that blueberry plants are susceptible to as well as the environmental factors that favor disease development. Management strategies can then be developed specifically for individual farms or fields within a farm. Selecting disease free sites and planting stock are first steps in preventative disease management. The primary symptoms of several diseases caused by fungi are described below along with preventative strategies for disease management.

Phomopsis Twig Blight and Canker (causal agent is *Phomopsis vaccinii*)

Disease Symptoms: Symptoms first appear on 1-year-old twigs with flower buds at bud break. Infected twigs may die back or suddenly wilt. Infected stems may have reddish-brown lesions that are about 1 to 4 inches long. Brownish cankers 4 to 8 inches long may be observed initially during in the summer on 1-, 2- or 3-year-old canes and can result in the death of the entire canes. Reddish-brown, brittle, dead leaves will persist on dead canes. Development of this disease is favored by wet weather, especially in the early part of the growing season. Infective spores are spread by splashing rain.

Preventative Management Strategies: Plant resistant and/or tolerant cultivars. 'Bluetta' is a cultivar with resistance and 'Coville', 'Earliblue', 'Elliott', 'Nelson' and 'Rancocas' have tolerance. Remove infected canes to promote drying of the plant canopy. This also serves to remove possible sources of inoculum and therefore slow spread of the disease. Use irrigation and fertilization management that promote early hardening off (don't irrigate or fertilize too late in season) of the blueberry plants.

Botryosphaeria Stem Canker (causal agent is *Botryosphaeria cortices*)

Disease Symptoms: Early symptoms of this disease include yellowing or reddening then dying of the leaves of one or more canes of 1- to 2-year-old plants. This will be followed by the death of infected branches with reddish-brown, brittle, necrotic leaves persisting. It is common to observe infected canes along side of seemingly healthy canes. Cutting a stem, with healthy and infected tissue, length-wise will reveal brown discoloration of the infected tissue while the healthy portion of the stem will have white or cream colored tissue. Plants can become infected anytime throughout the growing season. Development of this disease is favored by wet weather, especially in late spring. Infective spores are spread by wind.

Preventative Management Strategies: Remove infected plants to eliminate possible sources of inoculum and therefore further spread of the disease. Use good sanitation (clean tools and equipment) to avoid spreading the disease.

Fusicoccum Canker (causal agent is *Fusicoccum putrefaciens*)

Disease Symptoms: In the fall, initial symptoms of this disease are tiny water-soaked lesions, on the lower third of 1- or 2-year-old canes, which turn red by December. The following spring and summer the lesions develop into cankers resembling a target. Each canker is generally centered on a leaf scar. During the summer, generally when fruit are present, leaves on stems with cankers will wilt, die and persist on the stem. Canes can be re-infected throughout the growing season. Disease development is favored by wet conditions.

Preventative Management Strategies: Plant cultivars with tolerance or resistance to this disease. For example, 'Rancocas' has resistance and 'Berkeley', 'Burlington' and 'Rubel' have tolerance. Prune out infected stems to promote good air circulation within the plant canopy and also to remove inoculum for further spread of the disease. Other methods that promote good air circulation within the planting include proper pruning and good weed management.

Phytophthora Root Rot (causal agent is *Phytophthora cinnamomi*)

Disease Symptoms: Leaves of plants diseased with Phytophthora will yellow, turn red-brown, die and persist on the plant. Infected plants will stop producing new growth. Plants can die rapidly when conditions favoring disease development exist. This disease is caused by a soil borne, which requires free water for the spread of infective spores.

Preventative Management Strategies: Select a site with good drainage and avoid planting in low spots in the field to prevent soil water logging and the spread of this disease. Use good moisture management (for example, do not irrigate while it is raining) also to avoid spread of the disease.

Botrytis Blight (causal agent is *Botrytis cinerea*)

Disease Symptoms: Botrytis blight can affect flowers, leaves, twigs and fruit. Generally the flowers are infected first. Infected flowers turn brownish in color and can be covered with gray mycelium that can have black spores. Leaves may become infected next, developing brown necrotic lesions. Ripening fruit can also be diseased with Botrytis Blight and can be identified by gray mycelium and spores growing on the fruit. Cool temperatures and high relative humidity favor disease development.

Preventative Management Strategies: Avoid using excess fertilizer in the spring because it stimulates excess growth of susceptible young tissues. Promote good air circulation within the planting to encourage low relative humidity within the plant canopy. For example, use good pruning techniques, weed management and plant spacing.

Mummy Berry (causal agent is *Monilinia vaccinii-corymbosi*)

Disease Symptoms: In the early spring, leaves and young shoots infected with the fungus causing Mummy Berry droop, turn brown and die. Diseased fruit will shrivel or mummify turning from blue to tan in color. The fruit may also emit an odor similar to fermented dark tea. The berries that are mummified will fall off of the plant. The following spring the fungus causing Mummy Berry will produce cup-like spore-bearing structures called apothecia from the mummified berries on the ground.

Preventative Management Strategies: Plant cultivars having resistance or tolerance. 'Bluejay', 'Burlington', 'Darrow', 'Duke', 'Elliott', 'Lateblue', 'Northblue' and 'Northsky' have resistance to Mummy Berry and 'Bluecrop', 'Bluetta', 'Collins', 'Coville', 'Rancocas' and 'Spartan' have tolerance. Remove old berries from the plant and fallen leaves and berries from the

planting because they can be infected and spread infective spores. Another option is to cover old berries on the ground with 2 inches of soil or mulch before flowering to prevent infective spores from being spread.

Alternaria Leaf Spot and Fruit Rot (causal agent is *Alternaria tenuissima*)

Disease Symptoms: Leaves will develop circular to irregular light brown to tan spots with a reddish border. Infection by the fungus that causes Alternaria Fruit Rot begins at the blossom end of the fruit. As the fruit ripen, black spores can be seen and the fruit will become watery or leaky. Disease development is favored by cool, wet weather in the spring.

Preventative Management Strategies: Promote good air circulation within the planting to encourage drying within the plant canopy. For example, use good pruning techniques, weed management and plant spacing. Cool berries immediately after harvesting to preserves fruit quality. Use good sanitation (clean tools and equipment) to avoid spreading the disease. Adjust harvesting schedules to avoid over ripe fruit on the plants that favors disease development.

Anthracnose (causal agent is *Colletotrichum gloeosporioides*)

Disease Symptoms: Signs and symptoms of Anthracnose are found primarily on the flowers and fruit. Infected flowers turn brownish to blackish in color. As the fruit ripen, sunken spots at the blossom end may develop. White to light pink mycelia may also be present. Disease development is favored by high moisture in the plant canopy.

Preventative Management Strategies: Plant cultivars with resistance, including 'Elliott' and 'Little Giant'. Promote good air circulation within the planting to encourage drying within the plant canopy. For example, use good pruning techniques, weed management and plant spacing.

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THE ORGRANIC WAY- SOME IDEAS FOR WEED MANAGEMENT IN STRAWBERRIES

Elsa Sanchez, Assistant Professor, Horticulture Systems Management, and Kathy Demchak, Senior Extension Associate, Small Fruits Penn State University

Weed management is difficult in strawberry production, particularly in organic strawberry production where the few herbicides that are available for non-organic production are generally prohibited. This article describes some alternative weed management strategies to herbicides and mechanical and hand cultivation. Good site selection is an important weed management strategy. Select a site with minimal weeds and suppress the weeds in the site prior to planting. Green manure crops are good options for weed suppression. Select green manures that establish quickly and have large above ground canopies.

Quite a bit of research on weed management has been conducted at Cornell University. In one study on matted-row strawberries, critical times during the growing season when plants are most susceptible to weed competition were determined. Weed management efforts can be intensified during those key times. As expected, a key time for weed management is in the first few months during plant establishment. When weeds were not managed for longer than one month following planting, yield and runner production were lower than when plots were kept weed-free during the same time. When weeds were not managed late in the growing season (September) there was little effect on yield and the number of runners compared to when plots were kept weed-free during the same time. While this indicates that early-season weed management is most critical when establishing a new planting, key times of the year for weed management may vary depending on the weed species typically encountered and on soil moisture levels. In the study predominant weeds encountered included yellow nutsedge, common groundsel, purslane and numerous grass species. In no case should weeds be allowed to go to seed and suppress perennial weeds, regardless of the time of year, to prevent them from establishing.

In another study, the practice of growing different living mulches in the alleyways of strawberries in matted-row production was examined. Sudangrass, tall fescue or marigolds were direct seeded during renovation. Researchers found sudangrass to be the best of the three living mulch species for weed management because it rapidly established, was relatively drought tolerant and had a low fertility need. A disadvantage to the sudangrass was that it grew taller than the strawberry plants. However, to contend with this problem, it was mowed as it exceeded the height of the strawberry plants. Another drawback to using sudangrass was that a high level of strawberry clippers was observed compared to the other treatments.

Mulches can also be effective for weed management. In another study at Cornell, commercially available Planter's paper was found to be effective for weed management during the establishment year compared to not using mulch. Fabric weed barriers also are a good option for weed management. If using straw mulch for winter protection of the plants, placing the straw in the alleyways in the spring offers some weed control. If using the plasticulture system, the plastic may be

advantageous for limiting weeds. All of these options should be carefully evaluated for suitability on individual farms prior to using them.
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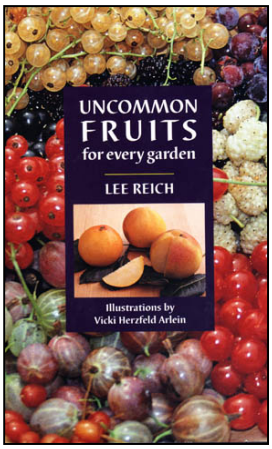
SMALL FRUIT REFERENCE LIBRARY REVIEWS

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

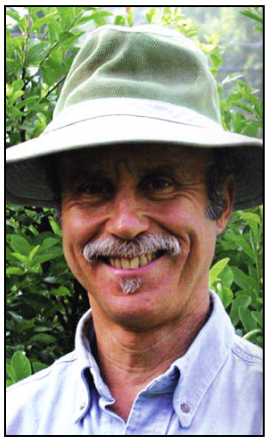
As we previously discussed, a reference library can be an invaluable asset, saving both time and money for the small fruit grower (See full article in the October 2004 issue of NYBN). Careful planning and selection of materials for your reference library can provide you with a broad knowledge base that is timely and in some respects, timeless. In this month's NYBN issue, we have included a review of another potential addition to your collection.

Book Review: Uncommon Fruits for Every Garden, by Lee Reich



So-called "minor" fruits (and this book discusses some of the most minor) are among our favorite crop plants. In part, that's due to our general appreciation of the strange and the neglected-the romance of the unusual. But it's also because we are convinced (and have been for decades, ever since we read J. Russell Smith's Tree Crops, became involved with the International Tree Crops Institute, and started an agroforestry nursery) that various temperate-zone fruits not usually found in grocery stores could play a significant role in providing food while helping to curb soil erosion and reduce resource inputs (including water and fertilizers), while cutting pesticide use. Yet these fruits remain "minor," foremost because the infrastructure necessary for mass-market commercialization is lacking: no grower organizations, no harvesting and storage institutions, and no marketing channels.

So, how to begin building such an infrastructure for any of these fruits? Try to get lots of folks familiar with the fruits. Lee Reich's new book is expertly calculated to do that: he is quite serious about the "for Every Garden" part of the title. This goes far beyond basic botanical descriptions and hints on growing and utilization: Reich provides abundant details on propagation, planting, fruit harvest and storage, as well as annotated lists of cultivars. Appendices cover climatic considerations, pruning methods, budding and grafting techniques, and more, with 11 pages of mail-order sources for plants and seeds. Yes, there is enough information here to enable most any gardener (subject to climate, of course) to grow and enjoy Juneberries, beach plums, alpine and musk strawberries, pawpaws, "raisins" from Hovenia dulcis, lingonberries, hardy kiwifruits (Actinidia species), mulberries, persimmons, gournis and related fruits (Elaeagnus species), gooseberries, maypop fruits, ches, black and red and white currants, Nanking cherries, cornelian cherries, Asian pears, jostaberries, lowbush blueberries, jujubes, shipova fruits, and medlars. No doubt, most people have never even heard of some of these fruits. You can be the first on your block (and perhaps the first in your town, or even in your entire state!) to grow them. You'll be a horticultural pioneer of the 21st century. And you might just help to establish a new agricultural industry, if you share your tasty produce and publicize your path breaking achievements. And don't forget to recommend Uncommon Fruits for Every Garden to anyone interested in joining you by growing some "minor-on-the-way-to-being-major" fruits!



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

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