New York Berry News

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What's Inside

The field planning season should be in full swing by mid-March. The last of your pruning chores should be in sight, your tractor and field truck should be tuned up (...don't let your NYS inspection lapse!), and you should be anticipating your early season disease sprays. It is very difficult to predict at this time of year whether the weather will warm up and push the plants earlier than we anticipate. To be on the safe side, blueberry growers should have their mummyberry spray and raspberry growers should have their cane disease spray ready to go. In this month's issue of the NYBN, I cover some strategies for managing these diseases. Also in this edition, Marvin Pritts goes over some of key practices growers can take advantage of to get their crop moving a little faster than their competition. As the plants begin to push, it is good time to assess the level of winter injury. Sonia Schloemann prepared a nice article that can help you assess the level of damage your crop may have suffered over this difficult winter. When the plants start growing...the weeds aren't far behind. Mary Jo Kelly and Lori Bushway put together a superb article of the pros and cons of the mechanical cultivators available to growers. And last – it should have been in last month's edition – an old article giving the finer points of pruning currants and gooseberries.

Upcoming Meetings

March 11-12, 2004: *2004 Produce Marketing Conference*, Hilton Inn, Grand Rapids, MI. For more information contact Wen-fei Uva at 607-255-3688 or by email at wl32@cornell.edu.

New York Farm Numbers Hold Steady

New York Agricultural Statistics Press Release

The number of farms in New York in 2003 remained constant at 37,000, according to Steve Ropel of the New York Agricultural Statistics Service. The amount of land in farms dropped from 7.66 to 7.65 million acres, giving an average size farm of 207 acres in New York. Although farm numbers have not changed much, there have been shifts in the number by sales class. Large farms with sales over $100,000 decreased by 400. There were 6,300 farms in that class in 2003. The area of land operated by these farms was 3.62 million acres making the average size 575 acres per farm in 2003. Medium size farms, those having sales between $10,000 and $99,999, increased in number. There were 11,200 farms in 2003 compared with 11,000 in 2002. The amount of land they operated increased slightly from 200 acres to 201 acres per farm. There were 200 more small farms with sales between $1,000 and $9,999 in 2003, at 19,500. The land in farms increased from the previous year to 1.78 million acres, giving an average farm size of 91 acres. There were 1,100 farms with sales of $500,000 or more operating 1.35 million acres in 2003.

The number of farms and ranches in the United States in 2003 decreased less than 1 percent to 2.13 million. Total land in farms was 939 million acres, a decrease of 1.55 million acres. The average farm size increased from 2002 to 441 acres. The number of farms in the economic sales class between $1,000 and $9,999 decreased to 1.20 million while farms with sales between $10,000 and $99,999 decreased to 601 thousand. Farms with over $100,000 in sales decreased to 327 thousand. Generally favorable weather, stronger commodity prices, higher value of commodities produced, farm consolidation and competition for other uses of farmland contributed to the shifting of farms among sales categories.

Court Approves $56 Million Ruling

The Fruit Growers News, March 5, 2004 (www.fruitgrowersnews.com)

The Minnesota Supreme Court has approved a Norman County jury award and judgment of $56 million against New Jersey-based BASF Corp. for allegedly defrauding United States' farmers in the sale of a herbicide in a national class action suit. The decision upholds the December 6, 2001, 12-member jury decision that awarded farmers $15 million in the case of Peterson vs. BASF Corporation. Since BASF was sued under the New Jersey Consumer Fraud Act, the court then tripled the award to farmers, according to plaintiff's attorneys. The trial court judge, Michael Kraker, raised the total amount BASF must pay America's farmers to $52 million with interest and costs. On March 11, 2003, the Minnesota Appeals Court agreed with Judge Kraker and affirmed the opinion in all respects.

The farmers are represented by Hugh Plunkett and Rob Shelquist of the Lockridge Grindal Nauen law firm and Doug Nill, all from Minneapolis. "Our clients and the class members have been watching this case from the day it was filed in 1997," Shelquist said. "Our hope is to move forward quickly to get money to the injured farmers." BASF originally registered a herbicide called Poast with the Environmental Protection Agency (EPA) in the 1980s to treat major and minor crops. At that time, Poast reportedly had little competition in the marketplace. As competition increased in the major crop market, BASF issued a new herbicide, called Poast Plus. Though the EPA approved Poast Plus for the same major and minor crops as Poast, BASF marketed its new herbicide for use on just four major crops and sold it at a cheaper price, according to the plaintiffs. According to the plaintiffs, both herbicides contain the same active ingredient (sethoxydim developed by Nippon Soda) in different concentrations, but when mixed according to the packaging, the mixture resulted in the same amount of active ingredient per acre. The plaintiffs contend that BASF labeled the products differently, omitting certain EPA-approved crops from listings on the new label, so minor-crop farmers would have to pay more per acre for Poast, even though the EPA actually approved both herbicides as safe for the same crops.

"In 1992, Poast Plus was selling at around $50 per gallon while minor crop farmers were paying at least $100 per gallon for Poast," Plunkett said. BASF executives said in court testimony that, "From 1992 through 1996, minor crop farmers paid an average of $32 per gallon more for the same weed killing ingredient," Plunkett said. BASF maintained throughout the case that the two products were not identical, and has said it intends to appeal the decision.

"It is our intention to appeal the case to the U.S Supreme Court," Jack Maurer, a BASF spokesperson said. When ask about the specifics of the case Maurer said, "Unfortunately, because the case is still in litigation, that is all I call tell you." Attorney for the class Shelquist said that it could take up to 6 months for the Supreme Court to hear the case. He also said that the class was certified four years ago. Growers affected were contacted at that time and if they did nothing they were included as part of the lawsuit.

California County Bans GMOs

The Fruit Growers News, March 5, 2004 (www.fruitgrowersnews.com)

Voters in a Northern California county have voted to ban the production of genetically engineered crops and animals. The vote earlier this week gave the county the distinction of being the first government body in the nation to pass such a rule, according to reports. According to proponent of the measure, thousands of Mendocino County farmers, business owners, vintners and families joined together to form a grass roots campaign. Measure supporters claimed that pro-GMO groups spent $621,000 on the campaign in a county of 47,000 voters. CropLife America, a group representing the developers, manufacturers, formulators and distributors of plant science solutions for agriculture and pest management in the United States, reportedly invested $150,000 in the last weeks of the campaign. The agri-industry group said that the industry still has several courses of action. "One of the possibilities would be statewide legislation (that allows GMO production) and another thing that could be on the table is some sort of legal remedy," said Allan Noe, with CropLife America. "Those are two possibilities, but business-wise it is not going to mean anything to us – there weren't any biotech crops planted there prior to this passing and there won't be any in the aftermath."

Noe said that the organization felt that the legislation was a short-sited activity of a bad precedent-setting nature. "We are letting the dust settle and looking at what options we have," said Noe. The value of the county's agricultural production in 2002 was $156.4 million, ranking 34th in the state. The top five crops, by value, that same year were wine grapes, $81.3 million; timber, $29.5 million; pears, $13.8 million; cattle and calves, $7.9 million and milk, $3.8 million. According to reports, this is not the first time voters in Mendocino have banned agricultural practices. In the 1970s, voters there reportedly passed a measure that banned aerial spraying of pesticides, only to have the state legislature strip counties of that right within two weeks

"These multi-billion dollar corporations underestimated the savvy and determination of Mendocino County voters," said Els Cooperrider of Ukiah, a retired medical scientist and Ukiah business owner who helped spearhead the initiative.

"We're the first county in the U.S. to prohibit the growing of genetically altered crops and animals - but we won't be the last," she said in a release. GMO-ban supporters say that Mendocino County's victory has already inspired voters in nine other California counties to begin campaigns to enact similar measures.

Starting the Berry Production Season

Marvin P. Pritts, Dept. of Horticulture, Cornell University, Ithaca, NY [*Edited by Bill Turechek*]

As the strawberry season gets underway, growers are thinking about marketing their berries. One of the major limitations for northern growers is the short harvest season for most berry crops. Supermarkets, in particular, prefer to work with suppliers that can provide them with product on a year around basis, if possible. Even if one markets directly to consumers, e.g. PYO, short harvest seasons are undesirable because one or two rainy weekends during a three week strawberry harvest can be disastrous. A number of approaches are available to extend the season, and while they offer the opportunity to expand markets, the economics may not be favorable depending on costs and prices. A few of them are covered here; however, growers should carefully consider the additional costs and likely returns *before* implementing a new technique.

Planting dates: Berry crops are perennial, so one typically does not consider the effect of planting date on season extension. However, where summers are cool, it is possible to stagger the planting date of strawberries, allowing them to fruit in the planting year, and harvesting them throughout the summer. Plants are specially grown in the nursery the year before transplanting so they will attain an adequate size for fruiting the following year. This usually involves higher rates of fertilization and runner removal. Plants are cold-stored after excavation from the nursery bed, and transplanted into production fields at high densities from May through July. Plants produce fruit within about 60 days. This technique is called the "waiting bed." These plantings revert into a matted row in subsequent years. Unfortunately, when the summer is hot, waiting bed plants perform poorly.

Environmental modification in the field: Modifying the climatic environment of a field of plants can be challenging, and there are a limited number of techniques available to achieve this. Two of the most common are mulches/groundcovers and row covers.

Straw Mulch: Delaying straw mulch removal in early spring will also delay flowering and fruiting in strawberries, but it will also reduce yields. We do not recommend this practice in New York.

Straw mulch is applied over the strawberry planting in early winter to protect plants from winter injury. The straw is raked from the plants in early spring just before the plants push in the spring. Research has shown that straw should be removed soon after snow melts and the danger of severe cold temperatures is past. Usually this is late March in New York State. The additional light that the plants receive in early spring is extremely beneficial for growth and productivity. Growers concerned about cold temperatures can use a rowcover to protect plants after the straw mulch is removed. In Vermont, researchers removed straw in mid-March, mid-April and mid-May in each of 3 years. In each year, yields were highest with the earliest straw removal date. Similar results were obtained in New York.

Row Covers: Row covers are perhaps the most effective method of accelerating flowering and fruiting in strawberries and primocane-fruiting raspberries. For strawberries, the straw mulch is removed from the plants early and replaced with row cover. As a general rule, March is an appropriate time to remove straw and apply the row cover. If snow still covers the planting, then obviously it is best to wait until melting has occurred. Similarly, if unseasonably cold weather persists in early March, then one should wait for warmer weather before removing the straw. The covers should be removed soon after flowers are observed. Without wind or bee activity, pollination will be reduced and fruit will be deformed. If cold temperatures (<30F) occur when the covers are still in place and flower trusses have emerged, water can be applied directly over the covers for frost protection. 'Earliglow' will fruit as much as 10 days earlier when rowcover is used, especially when the spring is cold and sunny.

For primocane-fruiting raspberries, rowcovers are applied in early spring as soon as snow melts and last year's canes are removed from the planting. Allow room under the covers for cane growth. Remove covers when canes are 18 inches tall. This practice accelerates harvest of Heritage from 10 - 14 days, and offers some degree of frost protection for new canes in early spring.

Various companies manufacture covering materials. The most useful have been lightweight (0.5 to 1.2 oz. per square yard), spun-bonded materials with sewn seams. The cost ranges from $800 - $1700 per acre. Although this may seem expensive, if prorated over several years, the cost is not that great. A higher price for early berries and generally higher yields make row cover use a profitable choice for many growers on at least a portion of their acreage.

Black Plastic: Strawberries can be planted through black plastic mulch to achieve earlier fruiting in spring. However, runnering presents a problem because they cannot root through the plastic. Runner removal is expensive and this represents a loss of energy for the plant. Some growers in warmer climates are experimenting with late summer planting on black plastic to avoid the runnering which occurs during early summer. However, this technique is riskier in more northern areas because the weather may not be conducive for fall growth and the probability of early spring frost is greater.

Pruning Gooseberries and Currants

Bernadine C. Strik, Dept. of Horticulture, North Willamette Research and Extension Center, Oregon State University, Canby, OR; and Tony D. Bratsch, Extension Specialist of Small Fruit (...and Vegetables), Department of Horticulture, Virginia Tech, Blacksburg, VA.

Prune when the plants are dormant in late winter. Red currants and gooseberries fruit in a different way from black currants, so you should prune them differently.

Red currants and gooseberries

Red currants and gooseberries produce most of their fruit on spurs that are located on 2- and 3-year-old wood. Canes (stems arising from the base of the plant) that are 4 or more years old are no longer productive; remove them when you prune. After pruning, a healthy bush should have 9 to 12 main canes: 3 to 4 each of 1-, 2-, and 3-year-old canes. Remove all canes older than 3 years and canes that are damaged or diseased. Prune to form an open center and remove canes that are low to the ground. After planting, a yearly pruning schedule would look like this:

- *Year 1:* At the end of the planting year, remove all but 6 to 8 of the most vigorous canes during the dormant period. Make your pruning cuts as close to the ground as possible.
- *Year 2:* At the end of the second season, leave 4 or 5 new 1-year-old canes, and keep 3 or 4 of the 2-year-old canes.
- *Year 3:* Keep 3 to 4 canes each from 1-, 2-, and 3-yearold growth.
- *Year 4:* At the end of the fourth and following years, remove the oldest canes and keep 3 to 4 new 1-year-old canes to replace the older canes you removed.

Black currants

Black currants produce best on 1-year-old wood. Strong 1-year-old shoots and 2- or 3-year-old canes that have an abundance of strong 1-year-old shoots are the most productive. When you prune, keep a total of 10 to 12 canes per mature bush--about half should be 1-year-old shoots. You can leave a few more shoots if the plant vigor is very high. Remove all shoots that are more than 3 years old. Make your pruning cuts close to the ground.

Because black currants bear most of their fruit on 1-year-old wood, you can prune them to produce on alternate years. In this system, prune plants to the ground during the dormant period. This causes the plant to produce many new shoots; no fruit will be produced the season after pruning. Don't prune the plants in the next dormant period, other than removing diseased wood or weak growth. The following year, they fruit on the 1-year-old wood. Prune your plants to the ground again the following dormant period, repeating the cycle. In this system you get fruit produced every other year on a particular plant. To get fruit each year, you can have half your plants fruiting in one year and the other half the next.

Training to a trellis

If you're growing black currants in a hedgerow, it's simplest to follow the alternate-year pruning method. Currants and gooseberries can be grown as a fan shaped bush on a trellis. Plants trained this way look attractive and produce a good crop of well colored fruit. To train to this system, plant rooted cuttings along a trellis with 3 to 5 wires. Space single plants 3 to 4 feet. Tie side branches to the wires as they develop. To develop a narrow fruiting wall, use the pruning techniques mentioned for the type of currant or gooseberry you're growing. This system requires a lot of labor and patience—only gardeners with a lot of experience should try it! (*Source:* Oregon State University Home Horticulture Publication EC 1361, online at http://eesc.orst.edu/agcomwebfile/edmat/html/ec/ec1361/ec1361.html *via* Massachusetts Berry Notes Berry Notes (2004) Vol. 16, No. 2).

Got weeds? New Cultivation Tools for Weed Management in Strawberry Fields

Mary Jo Kelly, Research Specialist in Berry Crops; and Lori Bushway, Senior Extension Associate in Berry Crops, Cornell University. Ithaca, NY

Managing weeds is one of your greatest challenges as a strawberry grower. Few herbicides are labeled for use in strawberry fields and effective hand weeding always takes more time and labor than you have or wish to afford it. Faced with this challenge growers and researchers continually search for innovative weed management tactics. Dr. Marvin Pritts' research team at Cornell found that early-season weed suppression is critical in the establishment year of matted rows. Excellent weed control from May into July promotes plant vigor and in subsequent years, helps maximize productivity and fruit quality. Dr. Pritts and his collaborators also found that new cultivation implements, in particular the flex tine harrow, the finger weeder and the brush hoe, are as effective as the traditional rototiller/multivator in weed suppression during the critical early-season period. Each implement has its advantage and disadvantage (see table below) but these new cultivation tools give strawberry growers additional proven options to meet their weed management challenges.

		Disadvantages	*Advantages*
	**Multivator:** Rotating blades slice weeds sub soil between crop rows	• Must be supplemented with weeding within row • No weed control in row • "Hard" on soil structure • Promotes weed seed germination	• Provides season-long control • Effective on larger weeds • Little crop damage • Moderately quick task
	**Brush Hoe:** Brushes, shreds, rips and smothers weeds between crop rows	• Must be supplemented with weeding within row • Requires a relatively large tractor • Requires two operators • Rows must be straight & precisely spaced • Slow process • Expensive implement	• Provides early to mid-season control • Useful in moist soil • Effective on larger weeds • "Kind" to soil structure • Does not bring weed seeds to soil surface
	**Tined Weeder:** Wire tines scratch soil surface, uprooting tiny weed seedlings within & between crop rows	• Time-consuming set up • Soil must be dry • Not effective on larger weeds • Promotes weed seed germination	• Can clean weeds between and within rows • Adaptable tine layout • Loosens crusted soils • "Kind" to soil structure • Relatively fast task
	**Finger Weeder:** Rubber "fingers" mounted on steel cone wheels pull weeds out within crop row	• Must be supplemented with between-row cultivation • Field must be level • Soil must be loose • Not effective on larger weeds • Relatively slow process • Promotes weed seed germination	• Ground-driven so can be used on smaller tractors
	**Reigi Weeder:** Rigid metal tines mounted vertically on spinning steel disks uproot weeds within crop row.	• Must be supplemented with between-row cultivation • Requires full attention of two operators • Soil must be relatively dry • Rows must be straight • May smother or uproot crop • Relatively slow process • Promotes weed seed germination	• Provides early to mid-season control • "Kind" to soil structure • Can be used on smaller tractors • Inexpensive implement • Easy to repair • Can also be used to remove winter straw mulch in spring

Researchers at Cornell University tested the designs from the following companies:

Tined Weeders		
▪ Einböck from HWE Agricultural Technology Ltd	Embrun, ON	(613) 443-3386
▪ Lely from DFK Equipment Sales Inc	Saint Marys, ON	(800) 881-3794
▪ Rabewerk from Machineries Agricoles St-CéSaire	Saint-CéSaire, QC	(450) 469-4081
Finger Weeder		
▪ Buddingh Weeder Co	Caledonia, MI	(616) 698-8613
Reigi Weeder		
▪ Univerco Inc. (www.univerco.net)	Napierville, QC	(800) 663-8423
Brush Hoe		
▪ Bärtschi-FOBRO Inc. (www.fobro.com)	Grand Haven, MI	(616) 847-0300
Torsion Weeder		
▪ Bezzerides Brothers Inc (www.bezzerides.com)	Orosi, CA	(559) 528-3011

Additional information about cultivation tools (including manufactures & distributors) can be found in: Steel in the Field: A Farmer's Guide to Weed Management Tools, available from SARE www.sare.org/steel/index.htm (802) 656-0484.

Assessing Winter Freeze Injury to Strawberry Crowns

Sonia Schloemann, Small Fruit Specialist, University of Massachusetts Extension, Amherst. MA

Strawberries are susceptible to winter injury in two primary ways. The first is damage to roots from the heaving of soil that can result from cycles of freezing and thawing in the spring. This heaving action can snap roots and lead to problems with root infections in the wounded tissue. The other way in which strawberries can suffer damage in the winter is from freezing of crown tissue.

The strawberry crown is actually a compressed stem structure with layers of vascular tissue that forms a cylinder with vascular tissue running spirally in two directions (Fig. 1). Inside this lignified or woody vascular tissue is a fleshy pith that can easily be injured and turned brown by the formation of ice crystals at low temperatures. The critical temperatures will vary with the variety of strawberry. Most of our Northern varieties can withstand crown temperatures of between 10 to 14°F. This is why mulching for winter protection is so important for this crop. At these temperatures, not only is the pith damaged, predisposing the tissue to infection by various pathogens, but the vascular function of the outer layer of cambium tissue can prevent normal transport of water and nutrients in the plant.

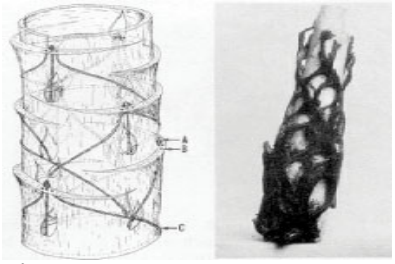

Figure 1. Morphology of the strawberry crown (from G.M. Darrow, The Strawberry: History, Breeding and Physiology).

Freezing injury is easily seen by cutting the crowns length wise and looking for damaged tissue. (Be aware that if left exposed to air for a while, this tissue will oxidize and turn brown like an apple when it is cut open.). Uninjured pith at the center is a creamy white when first cut. With slight injury to the crown, but not measurable in its effect on the plant, browning of the lower part of the pith occurs. Moderate injury, seen as a deeper browning, will result in noticeable damage to the plant (i.e., general weakening, slow growth, fewer blossoms and reduced yield). Lethal injury, where vascular tissue has been killed, will exhibit deep browning and blackening of the outer cambium and result in plant death.

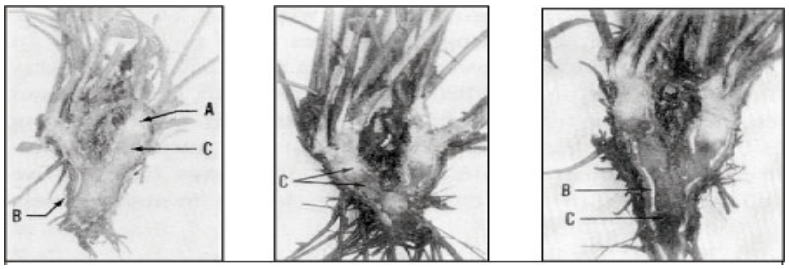

Figure 2. Uninjured crowns would have white centers at A. 1. The most serious injury occurs when the cambium that carries sap and food is killed. Slight recovery is shown by new cambium in pictures I and III at B. Plant II would not have recovered. The darkening of the centers of the crowns (C) is caused by the formation of frost crystals that break through the cell walls and oxidation follows, as in the browning of sliced apples. (from G.M. Darrow, The Strawberry: History, Breeding and Physiology)

If you suspect winter damage in your strawberry field, go out and cut some crowns a week or two after the ground has thawed (see Figure 2). If a high percentage of crowns show severe injury, it may be necessary to plow the field down and enter into a rotation cycle for a few years. This will help purge the soil of high levels of pathogens that may build up on the decaying strawberry crowns. Low levels of damage can be nursed through to better health by judicious irrigation, fertilization and other practices to keep plant stress low. See figure 2 for help determining if your plants have winter injury or some other type of crown/root damage.

Crop	Critical Temperatures	What to look for	Symptoms of winter injury
Strawberries	10 to 14°F (-10 to -12°C) (unmulched, crown temps)	Slice crowns lengthwise and look for browning in the normally creamy white crown tissue. In plants with mild injury, browning develops at the base of this area, more seriously injured plants will have browning just below the tip of the crown. The vascular tissue around the edge of the crown is less susceptible to damage, and if it is not destroyed, plants can recover to varying degrees.	Symptoms of sub-lethal winter injury include: ▪ weakened plants ▪ late leaf emergence ▪ narrow or deformed leaves ▪ early runner production ▪ fewer blossoms and ▪ lower yield
Raspberries ***Blackberries***	-20°F (-29°C) (hardy reds) -9°F (-23°C) (purples) -4°F (-20°C) (black raspberries) -0.5°F (-18°C) (erect blackberries) 8 to 12°F (-13 to -11°C) (trailing blackberries)	The raspberry plant parts most sensitive to cold are, in order, the pith in the basal part of the buds (most sensitive) the pith of the cane the vascular tissue at the base of the buds, and the immature flower tissue (flower primordia). These parts will appear brown or dried up. Tissue at the base of the buds is more sensitive than the buds themselves.	Symptoms include: ▪ bud death or ▪ production of short, weak lateral shoots or ▪ shoots develop normally at first, but then die under the stress of warm weather or cropping. The injury shows up at the tips of the canes and extends down the cane in proportion to severity.
Highbush Blueberries	-20°F (-29°C)	Slice flower buds with sharp knife or blade. Look for browning in the center of the bud (flower primordia). Buds at the tip of a shoot are more sensitive than buds at the base.	Cold temperatures damage stems and buds. Usually all the flowers in a bud are killed, but some damaged buds may produce 1-2 blooms, instead of 8-12. Very cold temperatures may also damage the cambium at the base of plant stems. Shoots on these stems will leaf out then die back.
Currants & Gooseberries	-31°F (-35°C)		Currants and gooseberries are very hardy compared to other berry crops. They bloom early, so spring frosts are a bigger problem than winter cold.

(Source: Ontario HortMatters, Volume #3, Issue #6, April 2003 *via* Massachusetts Berry Notes (2004) Vol. 16, No. 2)

Where's My Mummy?

Bill Turechek, Dept. of Plant Pathology, Cornell University, Geneva, NY

Mummyberry is caused by the fungus *Monilinia vacinii-corymbosi* and is one of the most serious diseases of blueberry in New York. From grower accounts, the disease appears to be more serious in the Southern Tier, Finger Lakes Region, and Western New York than in Eastern New York and the Champlain Valley. Nonetheless, if mummyberry has occurred in your planting, you are likely managing disease annually to prevent the 30 to 40% loss that is possible when no control is practiced.

The fungus causing mummyberry overwinters in infected berries or "mummies" lying under the bushes. In early spring, infected berries produce the primary inoculum (i.e., ascospores) in a mushroom-like structure called an apothecia (Fig. 1A). These spores are disseminated by wind and rain and infect emerging leaf buds and shoots. Shoots are most vulnerable to infection by ascospores when they are between approximately 1/8 to 1.5 inches in length (Fig. 2). Free water on the plant surface is required for infection and can occur within 4 hrs under the optimum temperature of 57 F; but takes nearly 10 hrs at 35 F. Infected shoots and leaves wilt, turn brown and die; this is the shoot blight phase of the disease (Fig 1B). Its appearance is similar to, and sometimes confused with, frost damage. Symptoms typically develop 2 weeks after infection.

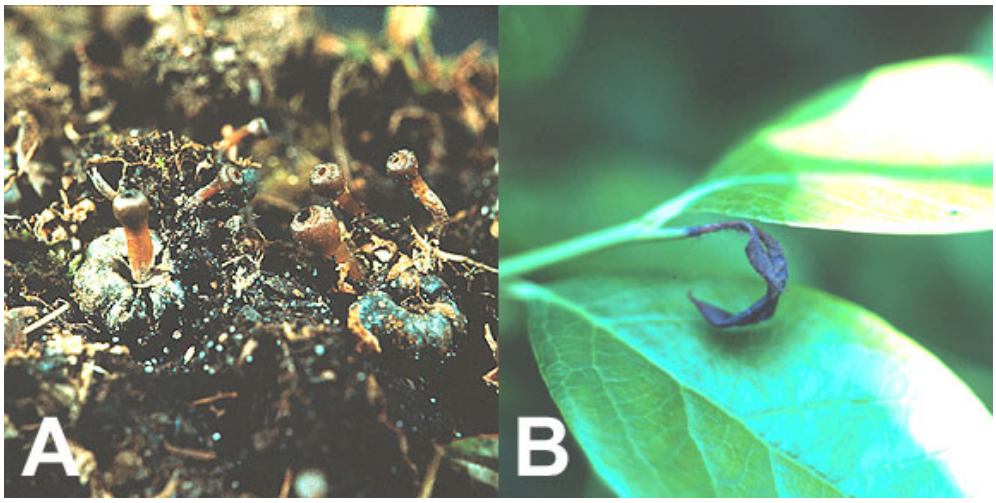

Figure 1. (A) Mushroom-like structures (apothecia) growing from mummified berries that produce the first spores of the season; **(B)** Shoot tip infection which will eventually lead to the production of secondary spores.

Infected shoots produce a second spore type, called conidia, which infect the blossoms. The formation of conidia requires high relative humidity. Conidia are disseminated to blossoms by both wind and pollinating bees. The bees are attracted to the masses of conidia at the ends of blighted shoots via the reflection of ultraviolet light off the surrounding necrotic tissue and by the "scent" of sugars secreted by the conidia. Once a conidium has been introduced in to the flower, it will germinate with the pollen and slowly infect the developing fruit. Blossom infections are therefore not evident until the fruit begins to ripen later in the season when the berries begin to shrivel and turn a pinkish color. These are the "mummyberries" and they have been colonized by the fungus. Infected berries eventually fall to the ground, shrivel, and turn dark brown in which they will serve as the primary inoculum source the following spring.

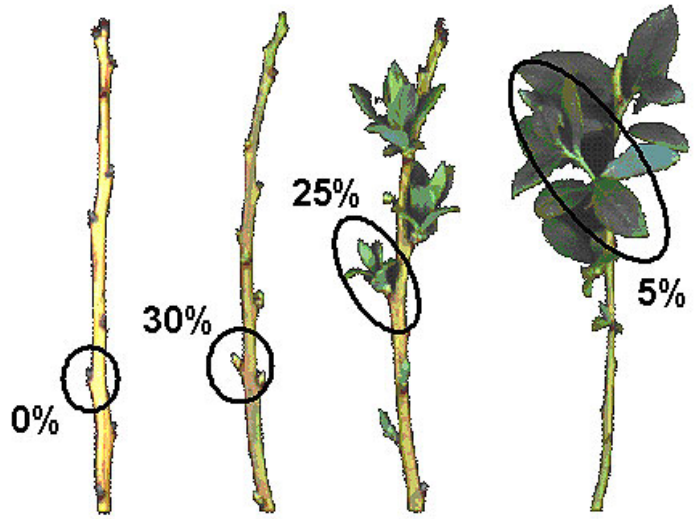

Figure 2. The proportion of emerging shoots infected by the mummyberry fungus at different growth stages under controlled inoculations (*Source*: Peter Oudemans).

Mummberry can be a difficult disease to control even under the best management practices. Like the disease apple scab, mummyberry is easier to manage if primary infections are well controlled. This can be partially accomplished using cultural practices such as raking or discing the soil beneath the blueberry bushes or covering the fallen mummyberries with a 3-4 inch layer of mulch *before* the apothecia appear in spring. Growers may also apply 200 lbs/A of 50% urea prills directly under the bushes to hasten the degradation of the mummyberries. The formation of apotehecia is greatly enhanced when the mummies make physical contact with the soil; burying these mummies disrupts their formation.

Fungicides are often necessary to manage disease on susceptible varieties or under high disease pressure. A key to efficient control with fungicides is to realize that the two spore types are managed differently. The primary spore stage is managed with a fungicide applications beginning at green tip (Fig 2). The most effective fungicides against the primary spore phase are Indar and Orbit. Neither of these fungicides have a federal label for use on blueberry; however, Indar 75 WSP was granted a section 18 by the EPA for use on blueberry against mummyberry on February 5, 2004. Under this section 18, a maximum of 5 applications may be made at 10-14 day intervals, at a rate of 2 oz. of Indar per acre. The section 18 expires June 30, 2004. If you still have some in your stocks, a green tip application of triforine (Funginex) would also prove to be an effective chemical treatment for the disease; unfortunately, this fungicide is no longer being produced. Echo 720 or 90DF are chlorothalonil products (like Bravo WeatherStik) which received labeling for control of mummyberry (as well as anthracnose) a few years ago. These products have not been tested in NY but in trials conducted in other states chlorothalonil has been largely ineffective in controlling mummyberry. The biofungicide Serenade (*Bacillus subtilis*), an organically approved, OMRI-listed fungicide, is now labeled for use on blueberry against mummyberry. I have not personally tested the material on blueberry, but results out of Annemiek Schilders program at Michigan State have shown good, albeit mixed, performance results. In other words, I would encourage organic growers and the *adventurous* non-organic grower to use Serenade if they have mummyberry concerns. For the less adventurous (such as myself), I would use in Indar until we have a better feel of how well Serenade performs over multiple years and locations. The blossom blight phase will be covered in the next issue.

If you are planting blueberries this year and are concerned about mummyberry, you should avoid planting in areas of the field that are prone to frost, that are wet, or are slow to dry as these areas tend to have more problems with mummyberry. A number of resistant varieties are available. A table of susceptible varieties is presented below. The table was compiled from resources at Michigan State University and the Northwest Berry & Grape Information Network: S=susceptible; MR=moderately resistant; R=resistant; n/a= not rated (differences in susceptibility ratings are not uncommon).

	Michigan	Oregon			Michigan	Oregon	
		Primary Infection	*Secondary Infection*			*Primary Infection*	*Secondary Infection*
Berkeley	S	MR	MR	Elliott	R	R	R
Bonus	MR	n/a	n/a	Jersey	MR	MR	S
Bluecrop	S	S	MR	Lateblue	R	MR	MR
Bluegold	S	n/a	n/a	Little Giant	n/a	n/a	n/a
Bluehaven	S	n/a	n/a	Nelson	n/a	n/a	n/a
Bluejay	R	R	R	Northblue	R	n/a	n/a
Blueray	S	S	MR	Northcountr	n/a	n/a	n/a
Bluetta	S	R	MR	Northland	S	S	S
Burlington	R	n/a	n/a	Patriot	n/a	n/a	n/a
Chippewa	n/a	n/a	n/a	Rancocas	MS	S	S
Collins	S	S	R	Rubel	S	R	S
Coville	MR	S	MR	Sierra	S	n/a	n/a
Darrow	R	R	MR	St. Cloud	n/a	n/a	n/a
Dixi	n/a	R	R	Spartan	MR	R	R
Duke	R	n/a	n/a	Sunrise	n/a	n/a	n/a
Earliblue	S	S	S	Toro	n/a	n/a	n/a
				Weymouth	S	S	S

Managing Cane Diseases of Raspberry

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Anthracnose, spur blight, and cane blight are 3 diseases where early season management is critical for good control. All 3 diseases cause lesions on the cane and can seriously impact the health of the planting. Anthracnose is caused by the fungus *Elsinoe veneta*. Symptoms of anthracnose appears as small, purple spots scattered on young canes and tends to be much worse on black and purple raspberries than reds (Fig 1). Spur blight is caused by the fungus *Didymella applanata* and is problem mainly on red raspberries. Symptoms of spur blight are centered on individual buds and appears as purple to brown blotches in mid-summer (Fig 2). Even though symptoms are not evident until later in the season, infection occurs early and infected buds fail to grow. Cane blight, caused by the fungus *Leptosphaeria coniothyrium*, is a problem on black and purple raspberries due to tipping practices, but can be equally problematic on red raspberries. Cane blight can be confused with spur blight. However, cane blight is much more likely to involve the entire cane (not just the buds) and infection sites are typically associated with pruning wounds or other injuries (Fig 3).

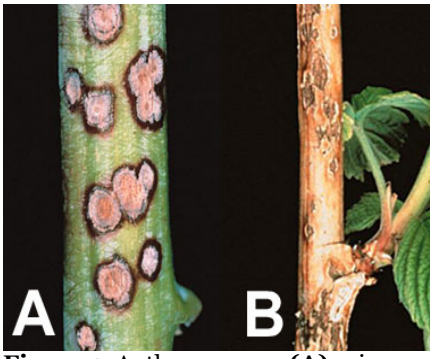

Figure 1. Anthracnose on **(A)** primocanes and **(B)** floricanes.

Figure 2. Spur blight on **(A)** primocanes and **(B)** floricanes.

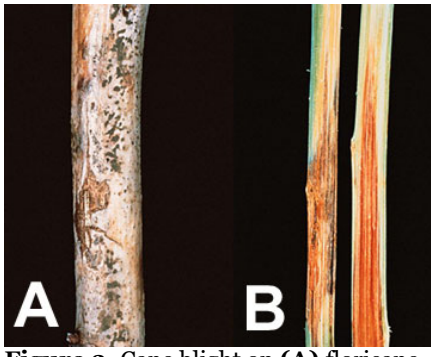

Figure 3. Cane blight on **(A)** floricane and **(B)** internal necrosis.

Managing these disease begins with pruning and removing diseased canes before new canes emerge in the spring. A dormant application of lime sulfur or copper is also highly recommended where any of these diseases are problematic. Liquid lime sulfur at 20 gallons per acre should be applied when new leaves are exposed 1/4 to 3/4 inches; if you are late in your application and don't spray until a few leaves have unfolded, cut the rate to 10 gallons per acre. Thorough coverage of the canes is necessary in order to achieve control so be sure that this application is done on a calm day. A note of caution: This spray may be phytotoxic if applied after ½ inch green, particularly on a warm day. A dormant lime sulfur spray is not needed on fall bearing raspberries because the previous year's canes should be mowed down and removed. Captan 80WDG is a new formulation of the old, workhorse fungicide captan that is now labeled on raspberry and blackberry for anthracnose and spur blight. Captan, though, should be saved for later season applications.

Early Season Berry Calendar

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Many small fruit growers produce more than 1 crop. In doing so, it can be difficult to keep track of what needs to be done and when; particularly if growing berry crops is new to you. The calendar below is an attempt to organize the necessary chores by month for each listed crop. One must consider, however, that some of the activities are phenology and/or weather dependent. e.g., removing the straw mulch. In situations such as these, the activity is classified in the month when it most likely to occur in New York. Lastly, where additional information is available within past issues of the New York Berry News, reference is made to the issue.

	March	***April***	***May***
Strawberry	**1.** Remove straw mulch in late March or early April. **2.** If desired, you can cover your planting with a spun-bound row cover to promote earlier cropping after straw removal. **3.** Set up sprinklers prior to bloom for frost protection.	**1.** Replenish bare or lightly-covered spots with straw mulch. This is necessary in plantings with a history of anthracnose. **2.** Scout for the foliar diseases leaf spot, leaf scorch, and leaf blight on over wintered leaves. Consider an early season fungicide application for fields with a history of heavy disease pressure (see NYBN vol. 1, no. 1 for more detail). **3.** Scout for strawberry clippers when temperatures routinely exceed 65 F.	**1.** Scout for tarnished plant bug. **2.** Apply gray mold fungicides. Elevate, Switch, and Rovral are excellent gray mold choices. However, if anthracnose or foliar diseases are of concern, you will want to tank-mix with Captan. Next month's issue of the NYBN will provide more detail on managing berry rots in light of several new fungicide registrations.
Raspberry	**1.** Scout for cane diseases anthracnose, spur and cane blights. In late March or early April, apply a "delayed dormant" spray of lime-sulfur for control of these disease if necessary (i.e., this is at budbreak). **2.** Delayed dormant sprays are not needed on fall bearing raspberries if previous year's canes were removed from the planting and thoroughly shredded.	**1.** Complete pruning. **2.** Apply Ridomil for Phytophthora root rot if necessary. **3.** Scout for orange rust on the under surfaces of new leaves of black and purple raspberries, and blackberries. Remove rust-infected plants. **4.** Apply pre-emergent herbicides	**1.** Apply nitrogen fertilizers to both summer- and fall-bearing raspberries. Calcium nitrate should be used on new plantings; urea or ammonium nitrate on older plantings. Applications can be split between May and June if desired. **2.** Apply Sevin for fruitworm and sawfly control where necessary.
Blueberry	**1.** Complete pruning. **2.** Apply a "delayed dormant" spray of lime sulfur for phomopsis **3.** An application of oil may be needed at this time if scale insects were a problem. However, this spray should not be applied in the same 14-day period as the lime sulfur spray because oil and sulfur when applied next to each other is extremely phytotoxic.	**1.** If additional mulch was not applied, lightly rake or disk soil beneath bushes just prior to bud break to disturb production of mummyberry spores. **2.** Green tip sprays: Mummy-berry, botrytis blossom and twig blight (see NYBN vol. 1, no. 2 for more detail). **3.** If you are clean cropping (no mulch) consider making a pre-emergent herbicide application.	**1.** Split application of ammonium sulfate or urea fertilizer between May and June. Do not fertilizer newly planted blueberries.

Check out the NYSAES Tree Fruit and Berry Pathology web site at:

www.nysaes.cornell.edu/pp/extension/tfabp

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