UNIVERSITY OF CONNECTICUT COOPERATIVE EXTENSION SYSTEM AND DEPARTMENT OF PLANT SCIENCE

CROP TALK

COMMERCIAL VEGETABLE AND FRUIT CROPS NEWSLETTER VOLUME 2, NUMBER 3 — DECEMBER 2006

IN THIS ISSUE

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Upcoming Events

- **IPM for Herbaceous Perennials**
  Tuesday, January 16, 9-12:30 pm, Sturbridge Host Hotel, Sturbridge, MA. Contact Tina Smith (413-545-5306; tsmith@umext.umass.edu).
- **CT Vegetable & Small Fruit Conference**
  Thursday, January 18, Tolland County Extension Center, 24 Hyde Ave., Vernon, CT. See full program on page 3.
- **Bedding Plant Meetings**
  A half-day (10-2:30 pm) program held in three locations:
  —Tuesday, January 23, Connecticut Ag Experiment Station, 123 Huntington St., New Haven, CT
  —Thursday, February 1, Tolland County Extension Center, 24 Hyde Ave., Vernon, CT
  —Tuesday, February 27, Litchfield County Extension Center, 843 University Drive, Torrington, CT
  Program includes updates on insects and mites, spring diseases, chemical growth regulators, pesticide storage, and other production tips. Registration required. Contact Leanne Pundt (860-626-6240; Leanne.Pundt@uconn.edu).
- **Perennial Plant Conference**
  Thursday, March 8, Lewis B. Rome Commons at the UConn Storrs Campus. All-day conference on perennial production, landscape design and retail marketing. Contact Mark Brand (860-486-2930; Mark.Brand@uconn.edu).

Greenhouse Energy Savers

John Bartok, University of Connecticut Ag Engineer Emeritus

Reduce Air Leaks

In some greenhouses, cold air infiltration adds considerable to the cost of heating. Cracks around doors, vents and shutters that don't close tight, broken glass and tears in the plastic are typical examples. For example, a 4 foot square shutter that fails to close fully and leaves 1/2 inch gaps will allow about 12,000 cubic feet of cold air to enter each hour. To heat this amount of air over a 24 hour period to 60°F when the outside temperature is 0°F requires almost 4 gallons of fuel oil. Most infiltration leaks can be corrected with minimal cost. Weatherstripping and foam insulation work well on small gaps. Shutters not needed for cooling should be covered with a sheet of film plastic or one inch of polystyrene or polyurethane insulation board. A few hours spent in tightening your greenhouses is well worth the effort.

Energy Blankets

The installation of an energy blanket reduces the volume of greenhouse that has to be heated. These are easiest between the trusses in large free-standing or gutter-connected greenhouses. The blanket usually is suspended or supported on cables. A tight seal at each truss and along the eaves is important to retain the heat below the blanket. Typically on a 0°F night with a 60°F plant zone temperature, you will find that the temperature above the drawn blanket will be about 35°F. Depending on the blanket material used and whether the greenhouse has a single or double cover, this results in a savings of 25% to 50% on the heating bill. At a cost of \$1 to \$2/ft^2 of floor area for the blanket system, the payback is usually less than two years.

Sidewall insulation

One factor that influences heat loss from a greenhouse is the amount of glazed area. In a 30' wide hoophouse, the glazed area from the ground to bench height is about 15% of the total surface area. Insulating this area with an inch or two of polyurethane or polystyrene can reduce total heat loss by over 10%. Use a closed cell insulation board and not beadboard, as this absorbs moisture, reducing its insulating value.

Pipe Insulation

Bare heating system pipes waste a considerable amount of fuel each year in areas such as boiler rooms and head-houses where heat is not needed. This heat loss continues every day the

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Greenhouse Energy Savers

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system is operating. Adding 1" thick fiberglass or foam insulation to a ¾" pipe will save about $2.25/linear foot, and on a 2" pipe about $5/linear foot, over the heating season in northern climates. The payback usually takes less than two years. Installation is simple and can be done by unskilled workers in slack time.

Install Floor or Under-bench Heat

Growers who have installed a floor or bench root zone heating system have realized a significant savings in heating costs. With a remote bulb thermostat located in the soil, set to maintain the optimum root temperature, the air temperature in the greenhouse can be lowered 5°F to 10°F while still getting good plant quality and growth. For every degree that the air temperature is lowered, a savings in heating cost of about 3% is obtained.

Heating System Maintenance Pays

Oil furnaces and boilers should be serviced at least once a year. Change the fuel filter and nozzle. Lubricate the motor and pump bearings. Check and adjust fan and blower belts. Clean or replace air filters. Remove soot from heat exchange surfaces and chimney connectors. Drain and flush dirty water from boilers to remove scale and lime deposits. Check combustion efficiency by measuring stack temperature and carbon dioxide content of the flue gases. Adjust the draft control to minimize soot and smoke content. Increasing efficiency 2%, which is possible with most heating units, will reduce yearly fuel oil consumption by 200 gallons in a 30' x 150' greenhouse.

Save Fuel—Check Thermostat Accuracy

Mechanical thermostats tend to loose accuracy over time. You can easily check the accuracy of a thermostat. Start by checking the accuracy of a good thermometer by inserting it into an ice bath. The reading should be 32°F. After allowing it to come back up to room temperature, place it next to the thermostat you want to check. Slowly move the dial until the heater turns on. The reading should be the same as the thermometer reading. If not, mark the thermostat accordingly. Next time the heating system is serviced, have the service person recalibrate it. If the thermostat set point is 1°F too high, a 30' x 100' double poly covered hoophouse will use an additional $300 of fuel for the heating season. This is based on maintaining 60°F inside where the average winter temperature is 25°F outside with fuel oil at $2.00/gallon, natural gas at $1.37/therm, or propane at $1.17/gallon.

Horizontal Air Flow (HAF)

Providing uniform temperature throughout a greenhouse is easy with the HAF system. Small, 1/10 horsepower, 12" to 20" diameter circulating fans spaced 40' to 50' apart create a horizontal air circulation pattern that mixes the air, end to end and floor to roof. One set of fans moves the air down one half of the greenhouse and another set moves it back on the other side. The fans are suspended, above head height, from the trusses or frame and operate continuously except when the exhaust fans are on or the vents wide open. The air moves at 50 to 100 feet/minute. The air pattern can be checked by placing a smoke bomb behind one of the fans. The fans cost from $100 to $150. Cost of operation is 25¢ to 30¢/fan/day. HAF results in a lower heating thermostat setting, less disease problems as moisture is continually removed from leaf surfaces, and air with a higher carbon dioxide content at the leaves.

Replace Incandescent Bulbs

You can save up to two thirds on your lighting bill by changing incandescent bulbs to the new compact fluorescent (CFL) bulbs. Replacing a 100 watt incandescent with a 32 watt CFL will save at least $2.50/year. These bulbs, which have a life of 10,000 hours as compared to 1,000 hours for incandescents, are available in many wattages and several shapes. Since being introduced in 1980, there have been many improvements. The new electronic ballasts use less energy and eliminate the humming noise. CFL's are now available for use with dimmers. To get the same light distribution as an incandescent, select a helical bulb. If the bulb will be used for retail sales, select one with a color rendering index (CRI) of 80 or greater. Remember that if you are going to be out of a room for more than 10 minutes, turn the lights out.

Harvest Period, Storage and Variety Selection to Optimize Eating Quality in Squash

Brent Loy, University of New Hampshire

Reprinted from UMass Vegetable Notes, Vol. 17, No. 20

Introduction

There are three major species of squash that are grown worldwide—*Cucurbita pepo*, *C. maxima*, and *C. moschata*. The species *C. moschata* includes calabaza or tropical squash, round to oval pumpkins grown in the Midwest for pie processing, and the popular butternut varieties, highly regarded for excellent shelf life. The species *C. maxima* includes the giant show pumpkins, Golden Delicious type processing squash, Hubbard varieties, and buttercup/kabocha varieties, the latter esteemed for their exceptional eating quality. Lastly, *C. pepo* is the species having the greatest variation in type, including hard-shelled gourds, summer squash, ornamental pumpkins, and winter squash. In North America, acorn is the most popular *C. pepo* squash, but striped Delicata and Sweet Dumpling varieties are known for having good eating quality. The demand for acorn squash has been adversely affected by generally poor quality of popular commercial varieties and the practice of harvesting squash before it reaches maturity.

Components of Eating Quality

People differ in their preference for flavor components and degree of moisture in squash. Nonetheless, connoisseurs of squash usually prefer a relatively dry squash that has a pasty, slightly moist texture after cooking and a high level of sweetness. High sugars not only contribute to a desirable sweet taste, but also mask undesirable flavor components associated with certain varieties. Sugar levels can be estimated easily by pressing juice from a small sample of flesh and measuring soluble solids in the juice with a hand-held refractometer. Relative sugar content is given in units of percent soluble solids (or degrees Brix). Soluble solids levels of 10% are passable, but generally levels of 11% or greater are considered necessary for good

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CONNECTICUT VEGETABLE & SMALL FRUIT GROWERS CONFERENCE

Thursday, January 18, 2007

Tolland County Agricultural Center, 24 Hyde Avenue (Route 30), Vernon, CT

Sponsored by: University of Connecticut Cooperative Extension System & Plant Science Department

8:00-9:00 Registration ($25 at the door)/Trade Show *(Coffee & donuts)*

** Lunch & coffee/donuts are included in registration fee as a 4-H Club benefit. **

PROGRAM:

Morning *(Moderator: Lorraine Los, UConn)*

9:00 Welcome—Dean Kirklyn Kerr, College of Agriculture & Natural Resources, UConn

9:05 **Easy Pesticide Record Keeping**—Candace Bartholomew, UConn

9:30 **Update on Tomato Grafting Techniques**—Rich McAvoy, UConn

10:00 **Improving Soils at Muth Farm**—Bob Muth, Pitman, NJ

10:30-10:45 Break/Trade Show *(Coffee & donuts)*

10:45 **Marketing at Farmers' Markets**—Jennifer McTiernan, Director of CitySeed, New Haven, CT

11:15 **Management & Sales of Tomatoes & Peppers at Muth Farm**—Bob Muth, Pitman, NJ

11:45-12:45 Lunch break/Trade Show *(Lunch included in registration fee as a 4-H Club benefit)*

Afternoon *(Moderator: Leanne Pundt, UConn)*

12:45 **Growing Table Grapes in New England**—Sonia Schloemann, UMass

1:15 **Corn: A Home Grown Heat Source for Greenhouses**—John Bartok, UConn Ag Engineer Emeritus

1:30 **Is an Outdoor Wood Boiler for You?**—Paul Seymour, Western Growers, West Springfield, MA

1:45-2:00 Break/Trade Show *(Beverages)*

2:00 **Blueberry Diseases**—Lorraine Los, UConn

2:30 **BirdShield™ Trials on Sweet Corn**—Jude Boucher, UConn

2:45 **Corn Earworm Spray Thresholds Trial for B.t. Sweet Corn**—Jude Boucher, UConn

3:00 **Pesticide Recertification Credits:** 3 Hours (pending DEP approval)

Directions: Take Exit 67 off I-84. Take Route 31 north to junction of Route 30 at first traffic light. Turn right onto Route 30. Tolland County Agricultural Center is on the right just after the Rockville Savings Bank.

Contact: Call the Tolland County Extension Center at (860) 875-3331 or email Jude.Boucher@uconn.edu with any questions.

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Optimizing Eating Quality in Squash

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eating quality in squash. The pasty texture of squash is attributable to starch. At harvest starch comprises about two thirds of the dry matter of squash, so squash with high dry matter also have a high starch content. Starch provides substrate for conversion to sugars during the latter stages of squash maturation and during subsequent storage. Squash with low dry matter, generally less than 16%, lack sufficient starch levels to produce the combination of pasty texture and degree of sweetness desired for acceptable eating quality. In varieties with low dry matter, starch is rapidly depleted by conversion to sugars, and the texture of the squash becomes watery and fibrous.

Stages of Squash Development

To understand how harvest period, storage and variety selection can affect eating quality, it is necessary to understand basics of squash development and maturation. This process includes not only the development of flesh quality, but also the effect of seed development on maintaining flesh quality. Small-fruited varieties of squash, such as acorn and kabocha, reach close to full size within 15 days after pollination (DAP) and subsequent fruit set. Dry matter and starch accumulation begins shortly after fruit set, but is most rapid between 10 and 20 DAP and reaches a maximum at 30 DAP (Figure 1). Sugar levels, on the other hand, are very low at 25 DAP, but continue to increase until maturation of squash at about 55 DAP (Figure 2). Some varieties, however, lack adequate sugar levels even at mature harvest, and need to be stored to develop sugar levels suitable for good eating quality.

Even though dry matter of the flesh (called mesocarp) peaks at about 30 days after pollination, seed development takes much longer. If a squash is cut open at 20 DAP, the seeds appear to be full size. This is because the seed coat, the leathery covering over the embryo, reaches full size by this time. But if the seed is cut in half, the embryo is actually barely visible at this time, being about an eighth to a quarter of an inch in length. The embryo expands rapidly and largely fills the seed coat cavity by 35 days after pollination. However, dry seed biomass (seed fill) continues almost linearly until about 55 DAP. Thus, a squash fruit can be considered to have reached full maturation when seed development is complete at about 55 days after pollination. If fruit are picked immature, seed development continues in stored fruit at about the same rate as in fruit left on the plant. Seed development in immature, detached fruit occurs at the expense of depletion of nutrient reserves in the fleshy tissue, thereby reducing dry matter (and starch) and lowering eating quality (Figure 1).

Post-maturation changes occur in stored fruit. There is a steady moisture loss during storage, so fruit fresh weight decreases. Respiration consumes carbon in the form of sugars, and starch continues to degrade to replace the sugar consumed by respiration. The eating quality of squash varieties with low sugar at harvest will initially be enhanced in storage because sugar levels increase. Eventually, however, long storage time will deplete starch levels to a point where the texture of the squash is compromised. To maximize shelf life, squash should be stored at 55 to 60°F with moderately high relative humidity (50 to 70%).

Because seed maturation is not complete until 7 to 8 weeks after fruit set, it is important to maintain a healthy plant until at least 50 days after fruit set. This insures a continuous supply of photosynthates (carbon source produced from photosynthesis) to the developing fruit. Seeds are considered the primary sink for assimilates such as sugars, so if photosynthesis is impaired by disease or insect feeding, nutrients for the developing seed are withdrawn from the flesh, depleting starch levels and lowering eating quality.

Figure 1. Changes in % dry matter of flesh in 'Tip Top' acorn squash harvested at different times, with and without 10-day storage at 70°F.

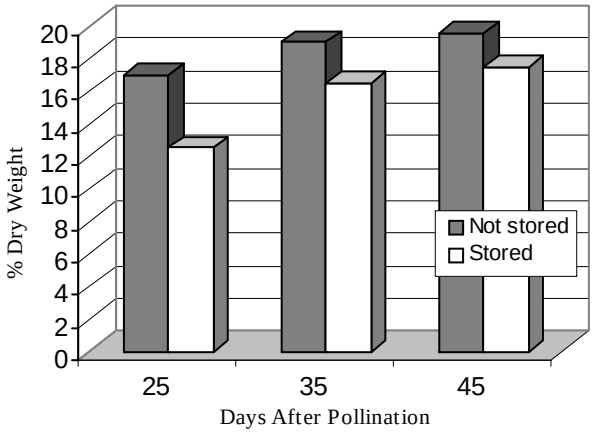
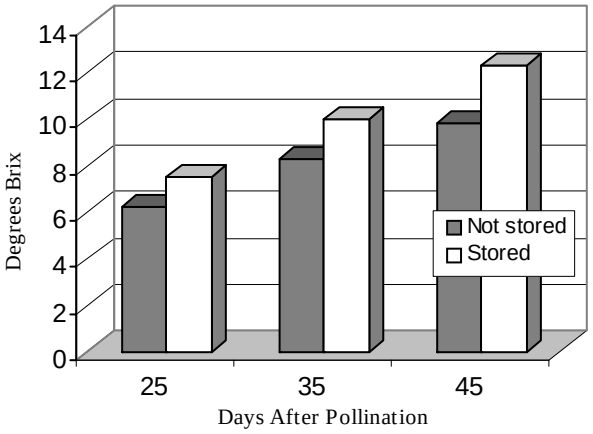


Figure 2. Brix levels in the variety 'Tip Top' at different harvest dates, with and without 10-day storage at 70°F.



Harvest Period and Eating Quality

Because fruit and seed development are similar in all three species of squash, their recommended harvest periods are similar. Butternut squash do not reach their characteristic tan color until late in development, so they are usually not harvested prematurely before seed fill is complete. With buttercup/kabocha varieties, it is actually desirable to harvest them before complete seed maturation, about 40 to 45 days after fruit set when the fruit is still bright green. The rind is harder so there is less damage to the fruit surface during harvest, and in turn, less chance for disease entry during subsequent storage. Kabocha squash are also susceptible to sunburn damage and changes in rind color to brownish green, so it is best to harvest

the squash before fruit are exposed to direct sun as the vines die down. In addition, kabocha squash have a high dry matter content, usually 20 to 30%, and a small seed cavity, so that any seed maturation following harvest has a minimal effect on depleting starch reserves in the flesh.

Acorn squash present the most difficult problem with respect to determining harvest time. Most modern acorn varieties not only reach near full size within two weeks after fruit set, but also develop a dark green to black mature color. For this reason, acorn squash harvested for the large wholesale markets are often picked immature. This can be easily observed in supermarkets by noting that the rind on the ground side of the squash is light green or light yellow rather than orange as it would be at maturity. If these immature squash are sampled, they are found to have very low sugar levels. If such immature squash are left in storage, then starch is depleted both by respiration and movement of nutrients from the flesh to the developing seed. The problem of poor quality in prematurely harvested squash is further exacerbated because most commercial acorn varieties and many of the newer striped varieties have inherent low dry matter and starch levels.

How Do You Determine When to Harvest?

Most acorn varieties are semi-bush and set most of the crown fruit within a period of about a week. Modern hybrids tend to produce some female flowers before male flowers appear and these usually abort unless there are other varieties of *C. pepo* nearby supplying pollen. But this is shortly followed by a period of both male and female flowering and fruit set. Some later fruit sets will occur on runners, but these fruit are usually undersized and lack quality, and so should not be harvested and sold. These late set fruit are a drain on photosynthates, and pruning these fruit off of the plant can actually increase quality of the crown set fruit.

Therefore, a grower can estimate the approximate time when fruit set occurred, and delay harvest until about 50 days from the fruit set period. Another approach is to check the ground spot on the fruit, and not harvest fruit until the spot turns orange. Some of the newer striped varieties of *C. pepo* will show some color changes with maturation, but the color change, say from white to tan between the stripes or stripes changing from green to orange, may occur well after the fruit are ripe enough to harvest. So with these, I think that it is better to keep track of the approximate date of fruit set. However, if you observe a color change that correlates with maturity in a particular variety, then you can use that as a harvest indicator.

How about variety selection? That is a tough call. I have found that most modern hybrids being commercially sold lack the eating quality of a good Sweet Dumpling or Delicata squash. UNH has developed some high quality acorn and sweet dumpling type varieties, and these will shortly be available to growers and home gardeners. High Mowing Organic Seeds will offer a sweet dumpling type hybrid, Sugar Dumpling, in their 2007 catalog. Johnny's Selected Seeds will hopefully be selling seeds of one of my new mini-acorns in 2008. All of these new UNH hybrids will have powdery mildew tolerance, and this is a big plus in reducing variability in quality because the vines will stay healthy until complete fruit maturity with minimal use of fungicides.

First Case of Brown Rot Resistance to Indar in New York

Wolfram Koeller, Deborah Breth & David Rosenberger, Cornell University

Reprinted from Scaffolds Fruit Journal, Vol. 15, No. 7

During the wet 2005 summer in the lower Hudson Valley, several peach growers noticed a declining level of brown rot control after they had applied Indar for controlling fruit rot. The same decline of Indar performance was reported for a peach orchard in Niagara County. In this orchard, blossom blight had been managed with captan, followed by three consecutive sprays of Indar against fruit rot. This program, which had been successful in the past, failed in 2005. Approximately 20% of peaches had brown rot at the time of harvest.

Prior to the 1995 registration of Indar for brown rot control in New York, Wayne Wilcox, the New York fruit and berry pathology Extension leader at the time, had conducted an extensive survey on the sensitivity of strains of the brown rot fungus to Indar and other fungicides belonging to the same SI class of fungicides. With his baseline sensitivity data on file, we were able to test and compare the sensitivities of strains isolated from diseased fruits from the peach orchard in Niagara County.

We discovered that the control failure experienced with Indar was caused by resistance. The pattern of resistance development was very typical for the SI class of fungicides. Strains of the brown rot fungus most sensitive to SI fungicides before they were ever used had been eliminated. Instead, 20% of the strains we tested in 2005 were up to 40 times less sensitive to these SI's than the strains tested in 1993.

How were these resistant strains selected? The spray history for this peach orchard in Niagara County was available for 1996 to 2005. Blossom blight had been managed with 3 to 5 captan sprays. Fruit rot had been managed with two Indar treatments, starting at 'turn of color.' This would add up to a total of 20 to 25 Indar applications. Would this total of sprays be sufficient for developing resistance to Indar?

Most likely not. Immediately adjacent to the peach orchard had been a small, old, "fresh fruit" nectarine orchard with notorious brown rot problems. There, Indar had been used much more often and starting with blossom blight control. We must assume that SI-resistant strains of the brown rot fungus were selected in this small "fresh fruit" nectarine orchard, and that these SI-resistant strains had found their way into the adjacent peach orchard.

Where do we go from here? Indar has been the most effective brown rot material among several other SI fungicides. As expected, all brown rot strains resistant to Indar were also resistant to Orbit, Elite and Nova. If declining brown rot performance with Indar becomes a problem, switching to Orbit, Elite or Nova will not solve this emerging problem of resistance. We must remember though that the SI fungicides also provide good control of powdery mildew, which apparently remains sensitive. SI's also control cherry leaf spot. Unfortunately, the cherry leaf spot fungus has also developed SI resistance in Michigan.

Our thoughts about brown rot control in the future are as

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Novel Structures for Extending the Cut Flower Season

Ted Blomgren, Windflower Farm

Reprinted from the Proceedings of the 2003 New England Vegetable and Berry Conference

Cut flower growers in NY use several season-extending strategies to produce marketable flowers continuously from spring through fall. Growers use early blooming cultivars, early sites on the farm, cultural practices that warm the soil and plant environment, and a variety of structures to extend favorable growing conditions. Spring bulbs and early-blooming perennials are good options for extending the season. The annual cultivars often selected for early production are stock, campanula, snapdragon, Bells of Ireland, larkspur, godetia, and sweet peas—all species that produce well in the cold, wet conditions typical of our spring weather, and that can be made to bloom even earlier with modest investments in growing structures.

Site selection is important for early field production. The earliest plants should be transplanted into soils that are well drained, because these are the first to warm. Fields should be selected that are protected from cold, desiccating winds, and that have a southerly aspect. Some flower growers use raised beds to create a drier and warmer root zone, and floating row covers, to create a warmer microclimate for the aboveground portion of the plant. And some growers use plastic mulches in various colors to enhance earliness. Use of these simple strategies can extend the season by two weeks or more, and usually produce flowers of superior quality.

Cut flower growers use a number of structures to extend the cut flower season, including low tunnels, walk-in tunnels, and high tunnels. Low tunnels are used widely in commercial vegetable production. They are made by placing #10 wire hoops over the row every 6 to 10' in order to suspend wide or narrow floating row covers over the young plants. This provides wind protection and a few degrees of frost protection. The cost of low tunnels can be as little as $\$0.05/ft^2$. The problem that some farmers face is that the flowers outgrow the low tunnels before problems with wind and cold temperatures have abated.

Walk-in tunnels are portable tunnels that may be covered with greenhouse plastic or Typar. They are variable in size, but often measure 10 to16' wide by 100 to 300' long. They have two to three 48" beds. The hoops are slipped over rebar ground stakes. A rope tied from hoop to hoop is used to form the ridge purlin. The covering is held fast by ropes that are drawn over the top of the structure and are secured to stakes in the ground. The tunnels are tall enough to walk in (hence, the name). The flexible tunnel length enables growers to place a tunnel virtually anywhere on the farm because it is sized to fit into a farm's existing bed spacing. This dimension also allows for the use of commonly available greenhouse film (4-year, 6 mil) or Typar (1.25 oz/yd^3 floating row cover). The tunnels are accessed and vented by rolling up the sides. Walk-in tunnels are intermediate between high and low tunnels with respect to wind protection, temperature modification, impact on the timing of crop maturity, ease of construction, and cost (less than $\$0.25/ft^2$). These field tunnels produce their blooms three to four weeks ahead of those in the field. In addition to the early flowers listed above, the season's first sunflowers might be produced in these structures. In the summer, the tunnels may be used to keep China asters free of the insects that transmit aster yellows. Walk-in tunnels may be used in the fall to produce a second succession of annuals. These tunnels may be erected after beds are formed in the spring. For earlier production, it may be worthwhile to form beds and erect hoops in the fall.

High tunnels are essentially greenhouses without heaters or automated ventilation. These structures are covered with standard greenhouse plastic. Ventilation is accomplished using rollup sides. Some growers use portable heating systems to prevent freezing injury to crops. A wide range of sizes is available. Inside the high tunnels, raised beds and wide row covers frequently are used. High tunnels produce the earliest and latest flowers of all the tunnels discussed, and some growers use them to produce their most valuable varieties, including early spring bulbs, lisianthus and lilies. The high tunnels are about a week earlier than the walk-in tunnels because they are larger and are less affected by perimeter cooling. Growers begin planting annuals at the end of March, and start harvesting in mid- to late May. Bulbs are even earlier. Although not nearly as expensive as heated greenhouses, the over $\$2.00/ft^2$ cost of these units can be prohibitive. To reduce unit costs, growers often produce two successions of flowers each year from each bed in a tunnel.

No-Tillage Pumpkins

Steve Groff, Cedar Meadow Farm

I have been no-tilling pumpkins for 11 years now. It was a natural transition since I had been no-tilling most of my other crops before. A significant number of growers have been trying it as well with some quite successful and others disappointed. The driving force behind no-till pumpkins seems to be cleaner fruit that is a result of the pumpkins laying on crop residue or a cover crop.

How the System Works

The foundation of this system is the establishment of a cover crop in the fall. My favorite for no-till pumpkins is a mix of hairy vetch (25 lb) and rye (30 lb). I credit rye/vetch with 40 to 50 lb of N. Straight vetch will supply 75 lb of N but the vetch residue decomposes too quickly to keep the pumpkins clean. Vetch seed is expensive so I grow my own and sell any excess. Rye alone works well but you have to use more N to grow both the rye and the pumpkins. No-tilling into previous crop residues has been successful but you lose some of the advantages of a cover.

I control the cover crop mechanically with a modified 10-foot Buffalo Rolling Stalk Chopper and Roundup. The stalk chopper has two rows of rollers, four in front and four in back, with eight 23-inch blades per roller. I added parallel linkage so each roller floats independently. The turning rollers crimp the cover and push it down. It can be run at 8-10 miles per hour, so it's fast and economical.

Typically I will spray ½-1 pt of Roundup into the standing rye and then roll 2 days later. It is important to roll the cover before wind blows it in various directions so it is laid parallel to the direction of planting. I always roll soon after the rye is 4 feet tall unless the cover is thin and will not blow down. After pumpkin harvest, I use the rolling stalk chopper to disperse the remaining pumpkins.

Soon after planting I spray Strategy and then pray for rain. If grasses break though, Select is used to control them. Sandea will take care of pigweed but not lambs quarter. I have sprayed Sandea before crop emergence and then it will give a little lambsquarters control. Sandea does hold the pumpkins back at least a week even if used pre-emerge.

I've successfully eliminated all herbicides when I have a good thick mulch cover. This system does have potential for organic growers when a heavy cover is achieved.

I use a customized Kinze no-till planter with Monosem row units to direct seed the pumpkins. This machine has Rawson coulters, Yetter parallel linkage, Martin spading closing wheels, and foam markers. I plant in 90" rows. The leading 13 wave 1" coulter is set on the row to cut 4" deep. This gives a nice clean cut thru the residue. Depending on conditions I set the row cleaners to take out just a bit of residue but not a whole lot. I don't want to see much soil showing on the row. I like to plant the seeds 1 to 1.5" deep in the soil. I've also customized an RJ Equipment carousel no-till transplanter for no-till transplanting of pumpkin seedlings into killed cover crops. This transplanter has a spring-loaded 20-inch turbo coulter, followed by a double-disk opener and a short shoe to place the transplant in. Angled press wheels tuck the soil firmly around the plant. The package leaves virtually no soil showing after the crop is planted, giving good full coverage mulch for the whole season.

Fertilizer management evolves as you have become more committed to the use of no-till, cover crops, and the overall concept of sustainable ag. Any synthetic N I use is mainly ammonium sulfate. I need the sulfur it supplies, as well as its low volatility. I side-dress by broadcasting 40-80 lb of dry N (depending on contribution of cover) 3 weeks after planting. I do some foliar feeding as well.

Soil compaction is to be avoided at all costs! However, once you've no-tilled for several years the soil becomes noticeably less susceptible to compaction. Cover crops are key in building soil structure. I'm real fussy about when lime and manure trucks can get on my fields. If you ever need to alleviate compaction, do so with as little surface disturbance as possible.

Controlling perennial weeds can be a challenge but I have found that with intensive crop rotation and occasional spot spraying, they can be managed effectively. Don't count on a cover crop to eliminate thistles, bindweed, hemp dogbane, etc.

Common mistakes

- Allowing the cover crop to lodge before rolling. A cover such as rye is nearly impossible to plant into if the stems are lying across the pumpkin row.
- Not enough N when rye is grown as a cover crop. Rye takes out a lot of N and releases very little during the growing season.
- Improper seed to soil contact due to lack of proper planting equipment. You need to do whatever it takes to get the seed in the ground.

Pumpkins are a lot cleaner in this system because the soil doesn't splash up on them when it rains. I have found that this is the main selling point of no-tilling pumpkins. It is believed that nearly ½ of pumpkin acreage in Lancaster County is now no-tilled.

Berry Cultivar Update

Kathy Demchak, Penn State University

Reprinted from Fruit Times, Vol. 25, No. 11

There are a number of berry cultivars that have become available in recent years. Not all are new varieties—some are older ones that serve new purposes, or that have not been available to growers until recently. Cultivars marked with an asterisk either have been recently trialed in PA or are currently in field trials in PA. Year of release and origin are given when known, as this information may be useful in judging potential adaptability of a cultivar to a given region.

June-bearing Strawberries (Matted-row Production)

****Evangeline*—**1999, AAFC-Nova Scotia. Early season. Dark red fruit with good flavor and uniform size and shape. Resistant to leaf diseases, so caps remain green. However, fruit is very small.

****Itasca*—**2005, Univ. of MN. Early season. Though ripening begins with Earliglow, harvest continues for a longer period of time, resulting in high yields. Maintains size better than Earliglow, but berries can be soft and low on flavor.

***Wendy*—**2005, AAFC-Nova Scotia. Early season. Has similar color and firmness to Evangeline, one of its parents. However, in 2006, fruit size in Nova Scotia was about 40% larger than for Evangeline, and yields about 50% higher. Susceptible to *Verticillium* wilt. Resistance to red stele unknown.

****Bish*—**2002, NC State Univ. Early-mid season. Developed for use in plasticulture, but it produces plenty of runners in the matted-row system. Excellent flavor, but low yields due to many blossoms opening black, an indication that it comes out of dormancy too early in PA.

****Brunswick*—**1999, Nova Scotia. Early-mid season. Yields well, but has average flavor that can be a bit acidic. More likely to perform better in cooler locations. Susceptible to *Phytophthora* crown rot.

****L'Amour*—**2003, NYSAES, Geneva, NY. Early-mid season. Excellent all-around performer. Good foliar disease resistance. Nicely-shaped fruit with good size, medium-red color and above-average flavor.

****Clancy*—**2003, NYSAES, Geneva, NY. Midseason in central PA, though it produced fruit later in NY. Deep red color with good size, but yields were low in PA trial where it produced few runners. May fare better in more northern locations in the state, as it appears to be performing better in states north of PA.

****Darselect*—**1995, Darbonne nursery, France. Midseason. Nice size, shape, and flavor. Yields typically are not astronomical as expected, but still are above average. Susceptible to anthracnose fruit rot and leaf scorch.

****Cabot*—**1998, AAFC-Nova Scotia. Mid-late season. Huge fruit, high yields. Produces few runners. Primary berries are oddly-shaped. Good flavor, but fruit center may be hollow. Probably better-suited to U-pick operations.

***Canoga*—**1979, NYSAES, Geneva, NY. Mid-late season. Older cultivar that has been resurrected mainly for use in plasticulture due to low runnering. Grower reports indicate that size, flavor and yields are acceptable in matted-row production and plasticulture.

****Winona*—**1996, Univ. of MN. Mid-late season. Berries may color unevenly, and have short pedicels, so fruit is in close contact

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Berry Cultivar Update *(Continued from page 7)*

with the ground and is prone to various fruit rots.
****Ovation*—**2003, USDA-Beltsville. Late season. Nicely-shaped berries with medium-red color. Good flavor. Yields are low for the amount of foliage, and not as high as expected. This seems to be happening in a number of locations. Growers also report that yields are not sufficiently high in the plasticulture system.
***88-74-1*—**Italy. Late season. Hasn't been trialed in PA. Yields variable in trials in various locations, though there does appear to be the potential for high yields. Average to large size fruit.

June-bearing Strawberries (Plasticulture Production)

Bish/Canoga/Ovation—See descriptions above.
****Carmine*—**2004, University of FL. Deep red fruit, with good quality, but yields were less than half that of Chandler in PA trial in high tunnels and berries were small. Performance has been better in other locations.
****Ventana*—**2003, University of CA. Fruit quality, size, and color was good, but yields were only about half that of Chandler in PA.

Day-neutral Strawberries

***Albion*—**2006, University of CA. Fruit is reported to be very large and sweet in original trials. Said to be resistant to *Verticillium* wilt, *Phytophthora* crown rot, and anthracnose crown rot. 2006 was the first year that material could be allowed outside of CA for testing. If anyone has an opportunity to try this one and has results to share, let me know.
****Everest*—**From Edward Vinson, Ltd. U.K. breeding program. Soft fruit with mild flavor. Watch rotations due to *Verticillium* wilt susceptibility.
***Evie-2*—**From Edward Vinson, Ltd. U.K. breeding program. Though Evie-2 has some good qualities, there are later cultivars from this same program that are expected to have improved characteristics.
****Seascape*—**1992, University of CA. Excellent flavor, size, color, and productivity in PA trials. However, it tended to be a bit soft and split easily with rain.

Summer-bearing Red Raspberries

***Lauren*—**1997, MD-NJ-WI-VA breeding program. Early season. Large fruit, long harvest season, and as with all cultivars from this breeding program, excellent flavor. Subject to winter injury, so plant in protected mild locations. Also susceptible to *Phytophthora* root rot.
****Prelude*—**1998, NYSAES, Geneva, NY. Early season. Actually a primocane-fruiter, but it was expected to fruit so late that most of its crop would be produced as an early summer-bearer. In central PA, although it fruited well in the summer, it also produced a fair amount of fruit in the fall. Fruit is medium-sized and has good flavor.
***Moutere*—**From New Zealand. Early-mid season. Very little trialing has been done in the U.S. Medium to large fruit size.
***Encore*—**1998, NYSAES, Geneva, NY. Late season. Good flavor. Nearly spineless canes.
***K81-6*—**AAFC-Nova Scotia. Late season. Large fruit, good flavor, productive. Winter hardy, but susceptible to fluctuating temperatures. Susceptible to *Phytophthora* crown rot & fire blight.

Primocane-bearing Red Raspberries

***Jaclyn*—**2004, MD-NJ-WI-VA breeding program. Very early fruit on primocanes. Large uniform dark fruit on long receptacles. Can be soft in high temperatures.
***Joan J*—**From Kent, England. Thornless canes, large dark red fruit with good flavor. Has been very productive in most trials.
****Josephine*—**2001, MD-NJ-WI-VA breeding program. Josephine is a productive late-season cultivar with large flavorful berries. However, due to a problem with propagation, this cultivar is not available at this time.

Black Raspberries

****Mac Black*—**Yields have varied among sites, and there have been some reports of problems with winter hardiness, though not to any greater extent than with other cultivars. Size is good, and the best part is that it extends the black raspberry harvest season, since it ripens 7-10 days later than other cultivars.

Blackberries—Thorny

****Chickasaw*—**1999, University of AR. Very good flavor, and very large fruit. Had some trouble with plant establishment in PA, which was probably due to low quality of plants received.
****Fort Kent King*—**Selection from ME. Could be very winter hardy, but I'm not sure it matters. Produces numerous canes, and a lot of vegetation, so it's difficult to find its many small, flat-flavored fruit. May be OK for processing, however.
****Kiowa*—**1996, University of AR. Very large fruit, relatively long harvest season. Winter hardiness uncertain.

Blackberries—Thornless

****Apache*—**1999, University of AR. Large fruit with good flavor. Very erect plants.
****Ouachita*—**2005, University of AR. Fruit not quite as large as some other cultivars, but productive and firm. Not yet tested for winter-hardiness.
****Triple Crown*—**1996, USDA Beltsville. Very good flavor and high-yielding, but for milder areas of state, or high tunnels. Semi-trailing, so a trellis will be needed.

Blackberries—Primocane-bearers

[Because canes are cut to the ground, winter hardiness is not the limiting factor to yields, though lateness of harvest might be.]

****Prime-Jan*—**2004, University of AR. Thorny. Flavor is decent. Canes less stocky than for Prime-Jim.
****Prime-Jim*—**2004, University of AR. Thorny. Flavor is acceptable. Stocky canes.

Blueberries

[Notes on fruiting characteristics are based on trials in other states, as PA blueberry cultivar trials have not fruited yet.]

****Reka*—**1989, New Zealand. Early season. Limited availability in U.S. until recently. Medium-sized fruit, high yielding where tried in other states. Thought to be adaptable to a wider range of soil types than other cultivars.
****Draper*—**2003, MI State University. Early-mid season. Uniform berry size, medium-large fruit. Excellent flavor.
****Bluegold*—**1988, USDA-Beltsville. Mid-season. Though this cultivar has been around for a while, it hasn't received much attention until recently. Very productive with a concentrated harvest season. Cold hardy. Bushy growth habit. One problem trait is that the stem tends to remain on the fruit, or tears the skin when removed.

*__Legacy__—1993, USDA-NJ and Rutgers University. Mid-season. High yields during a long harvest season. However, it tends to hold its leaves during the winter. Good flavor. For trial in milder sites in PA.
*__Chandler__—1994, USDA-New Jersey. Mid-late season. Large fruit, high yields, though winter hardiness hasn't been well-tested. Ripens over a relatively long period.
*__Aurora__—2003, MI State University. Late season (begins ripening after Elliott). Medium-large fruit. Good flavor.
*__Liberty__—2003, MI State Univ. Late season. Very good flavor.

So, the most promising cultivars to try…

- *June-bearing matted-row strawberries:* L'Amour and Darselect.
- *Plasticulture June-bearers:* Still nothing better than Chandler.
- *Day-neutral strawberries*: Seascape.
- *Summer-bearing red raspberries:* Nothing new that I'm ready to recommend yet.
- *Primocane-bearing raspberries:* Josephine, when plants become available, in areas of the state with a longer growing season, or in a high tunnel. Fallgold is interesting also.
- *Black raspberries:* Mac Black has potential.
- *Blackberries:* Apache and Triple Crown are at the top of the list for warmer areas of the state.
- *Blueberries:* Should have more info next year, but for now, Bluegold looks good.

Signs for Your Farm

Vern Grubinger, University of Vermont Extension

Available online at http://www.uvm.edu/vtvegandberry/factsheets

My cousins used to have a memorial monument business. In those days they were stilled called gravestones. The sign for the business featured a slogan that resonated. It said "drive slow, we can wait."

If you're a grower that relies on retail sales, signs are important. They are your public personality. Signs can attract new customers, welcome old ones back, and set the tone for marketing at your farm, your roadside stand, or your farmers' market stall. Good signs are important both indoors and out. Outdoor signs get people to stop. Once they've arrived at your place of business smaller signs on displays and packaging provide information and positive messages and reinforce brand loyalty.

Even if you've been in business a long time, it's worth taking a fresh look at the images you are using to promote your farm and its products. If nothing else, signs get old and they need repair or replacement once in while. Faded and peeling is not a message you want to convey, even if you feel that way sometimes!

What's your image? Your signs should include an attractive logo, or 'brand image.' Does your farm have one? There are many interests competing for a space in the consumer's brain. A good logo is one way your business can gain a foothold in the soft tissue that counts.

Ideally, your brand image is easily recognizable and has become a symbol that sets off positive thoughts among your customers, like "fresh!" or "flavorful!" and "friendly!" Of course, it's up to you and your staff to provide high quality products and superior service—without fail—so that your customers do indeed harbor good thoughts about your farm.

Once you have a nice logo, don't waste it, paste it. Put it on all your signs, all your point of purchase displays, as well as all your retail and wholesale containers. Come up with a promotion budget so you can sponsor local events, school uniforms and who-knows-what-else to get your logo out there. Soon enough, it'll be as recognizable as Coke or Pepsi. Well, almost.

Can I read your roadside sign? The great thing about signs near public roads is they never stop working. They send out a message all day, every day. So it helps if people can read them. Like a lot of consumers, I'm at the age where I need glasses to read even when I'm sitting still. Put me in a car whizzing down the street and your sign had better be easy to see and to the point or I am going to miss what you're trying to tell me.

Keep your message short, because according to people that study these things, the average person traveling 40 miles per hour can read fewer than a dozen words from 200 feet away even if the letters are 7 inches tall. In my case, although I might be able to read your sign, at that distance and speed I won't be able to make up my mind about stopping until it's too late. And once I've passed your place it's doubtful I'll turn around. Folks like me need almost a quarter of a mile to make up their minds about pulling over, and that means your roadside signs need lettering that's a foot and a half tall.

Since people of all ages and reading abilities will be looking through their windshields, in good weather and bad, roadside signs must be easy to read. Besides big letters, use as few words as possible to tell a simple message. "Fresh Juicy Strawberries" or "Just-Picked Sweet Corn" work for me. Tell me the rest of the story about varieties, price, or production practices after I've stopped.

Leave plenty of white space around the words to enhance their visibility. Stick to dark lettering against a light background. Avoid unusual fonts and distracting decorations. Place the signs as close to the road as possible without blocking driver visibility or violating local laws.

Small signs can say a lot. OK, your attractive, easy-to-read sign worked like a charm, so now I'm out of the car, examining your products, and I've put my reading glasses on before I pull out my wallet. I'm ready for information. The first message I get, even if it's indirect, is how much you care about your own products. Cheap-looking, hastily-written price cards do not convey a sense of pride and stewardship. You've worked hard to grow these wonderful items, and grow them well. Surround them with carefully-made, artful labeling that testifies to the quality of your products rather than denigrating them.

Like a lot of contemporary consumers, I'm a label reader, and I want to know more about the product than just the price. Maybe I've got too much time on my hands, but humor me, I'll buy more stuff. Signs are a great way to tell a short story—not just the variety name, but who developed it and where. For example, "This variety was released by USDA over 30 years ago and is still popular today because of its great flavor!" Or, if it's an unusual product, tell me how to use it: "Great in soups!" or "Sprinkle with olive oil and garlic, bake for 1 hour at 400 degrees."

Finally, sharing a little personal story adds value to a crop in a way that can't be duplicated by others: "Asparagus is farmer Smith's favorite spring crop: tender, tasty and good for you, too. Almost worth the trouble of growing it…"

Brown Rot Resistance to Indar in New York

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follows: We do not know how widespread Indar (SI) resistance of the brown rot fungus has become or will become in the years ahead. If a declining performance of Indar (or Orbit) has been noticed, these SI fungicides should be replaced by alternative brown rot fungicides, at least during the fruit protection phase. Alternatives for both blossom blight and fruit rot management are the protective captan formulations (most now have a 24-hr REI). Another very active alternative would be Pristine. Pristine is a mixture of two fungicides and provides very good control of brown rot, powdery mildew and cherry leaf spot when used on a protective schedule. Pristine can be used five times during a season, but only twice in sequence.

When 'kick-back' activity is needed during blossom blight control, Rovral/Iprodione would be alternatives to Indar or Orbit. Use of these iprodione products is limited to two treatments per season for blossom blight control. Ronilan, which is no longer registered in the US, was a very similar fungicide, and resistance of the brown rot fungus to the class of dicarboximide fungicides has been found in other US states and many countries abroad. At present, we do not know where we stand on resistance to Rovral/Iprodione in New York. We can only speculate that resistance to these fungicides will not be a limiting problem, as they have not been used extensively in the past.

Some 'kick-back' activity during blossom blight control is also provided by the two anilinopyrimidines (APs) Vangard and Scala. However, neither fungicide is labeled for fruit rot control, and they have use restrictions on cherries (phytotoxicity).

What is the 'bottom line' for managing brown rot in 2006? The 'standard program' in the past has been to manage blossom blight with a protective fungicide such as chlorothalonil or captan, followed by Indar (or Orbit) for fruit rot control. This routine may no longer apply, because the brown rot fungus has developed resistance to Indar (and Orbit) in an orchard in Niagara County.

What can or should we do in 2006? Many things. We have numerous fungicides, in addition to Indar (or Orbit), for the control of blossom blight, and some provide post-infection control. We should utilize these fungicide options. Do we have a 'silver bullet' for the control of fruit rot in orchards where Indar (or Orbit) performance has noticeably declined? At this moment there is only one 'silver bullet' option: Pristine. For a full list of brown rot fungicides labeled in New York, see http://www.nysaes.cornell.edu/pp/extension/tfabp/brt.pdf.

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