the Southern Region small fruit consortium

NC State University
Clemson University
The University of Georgia
The University of Tennessee
VA Polytechnic Institute and State University

Small Fruit News

Volume 7, No. 3 July 2007

In this issue

Special Reports: Impact of Easter Freeze

Easter Freeze Recap, Grapevines in Virginia

Tony Wolf, Virginia Tech

We have a much better idea of the extent of vineyard frost injury as a consequence of the freezing temperatures on and immediately after Easter weekend at this point. Frost injury was widespread and in some cases extensive within a small area, but it was by no means complete. It's probably safe to say that the yield potential of early varieties like Chardonnay, Viognier and Chambourcin will be substantially reduced statewide, but primarily as a result of the significant damage in central and southern piedmont vineyards. The following are some of my observations and reports from growers on the status of vines following the freeze. Beyond the injury to the early-budding varieties in those two regions, the injury ranged from minimal to moderate. Some observations following the frost event follow.

Many areas in northern Virginia and in the northern Shenandoah Valley were spared significant injury. This related to both temperatures experienced and the degree of vine development. For example, here at Winchester, we experienced a low of about 26F under windy conditions, but Chardonnay was at less than 5% budbreak. We did have some primary shoot freeze injury on exposed shoots, but it was less than 5%. Other varieties here were less advanced and, consequently, had no injury.

One report from the Northern Neck estimated that injury was on the order of 30 - 50% primary buds frosted. The grower had a range of varieties, with later budding varieties such as Cabernet Sauvignon still at tight bud and sustaining no injury.

The Eastern Shore was *generally* spared, with vineyard temperatures of about 31F or higher. One exception was a vineyard where the temperature went as low as 24F on 10 April. This was the Tuesday after the weekend freeze and appeared to be an isolated event. We don't have a good explanation why this vineyard got so cold and others within 2 miles of it stayed relatively warm and injury-free. The vineyard that experienced 24F had about 80% primary bud kill on Chardonnay clone #4; other Chardonnay clones and red varieties were slightly delayed in development and did not sustain significant injury. Winds were generally above 8 mph through the Easter weekend on the Eastern Shore, occasionally much faster, but became negligible in the early morning hours of Tuesday the 10th, when the low temperature occurred.

The central and southern region of the state sustained the greatest frost injury owing to the advanced vine development. Low temperatures in vineyards that I visited were reported as generally in the low twenties although there were cases where the temperatures bottomed out at 18 or 19F. Chardonnay and other early-budding varieties bore the brunt of injury, as shoots were out anywhere from 1/2 to 2 inches. Typically 90% or more of these shoots were killed. Unfortunately, there was considerable injury to secondary buds as well, which will have some ramifications for cordon development as well as canopy development with cane-pruned vines. That is, growers who had laid out 18- to 24-inch long canes as future cordons, will find that many nodes may not push any buds, and that the process may have to be repeated next season in order to have uniform and consistent spur placement on the young cordons.

On a positive note, I have not seen evidence of vascular injury in any of the vineyards that I visited in April. Later budding varieties fared somewhat better even in vineyards where temperatures reached the teens.

The situation in the southern Piedmont is more variable. For example, our research vineyard at Blackstone (Nottoway County) dipped to 18F (ground level) on Easter Sunday when shoots of early-budding varieties were out 2 inches or more. Damage to primary buds was greater than 80% with some of

these varieties. Just south of there, near Lake Gaston, a grower indicated that 27F was the low (two consecutive mornings). That grower found minimal damage, as would be expected with windy, dry air and a low of only 27F. Other reports in the southern Piedmont included temperatures of anywhere from 19 to 22F. Injury was variable depending upon absolute low, stage of bud development, and the extent to which cultural practices might have affected bud development (see following comments). Our subsequent shoot-thinning in our research vineyard at Blackstone revealed many fruitful shoots – enough so that we were having to remove fruitful shoots in order to achieve our shoot density goal (4 shoots per foot of cordon) and our preliminary crop adjustment.

Some general conclusions:

- Unusually warm weather immediately before the Easter weekend freeze advanced vine development 7 to 10 days ahead of average and set the stage for increased frost injury on Easter weekend.
- The peculiars of the freeze made escape of freeze injury difficult to avoid. For example, vineyards that were located at high elevation saw damaging low temperatures early in the weekend when primarily advective freeze conditions existed. Low-lying vineyards, which were often warmer early in the weekend, saw their low temperatures later in the weekend when wind speeds diminished and/or skies cleared, allowing radiational cooling patterns to become established.
- the dry air and low dew point deferred freeze injury to a somewhat lower temperature, but vineyards that had exposed shoots/leaves saw very little shoot survival when temperatures dropped below about 26F. This is typical for what we've seen in previous freezes.
- double-pruning -- leaving long spurs -- with the idea of removing the more advanced, more apical buds after the threat of spring frost -- helped in at least one case.
- Meso-scale differences in low temperatures attained were occasionally on the order of 4 or more degrees F.
- Active frost control measures (heating, wind machines or helicopters, and overhead irrigation) were of limited or no value due to the duration of cold, the wind speed, or the absolute degree of cold attained.
- northern VA (and states further north) escaped significant injury due to delayed vine development.

Freeze Hits North Carolina Blackberry Growers in 2007

Gina Fernandez
Dept. of Horticultural Science
NC State University
Raleigh NC

On the night of April 7-8, 2007, blackberry plants across North Carolina (NC) experienced an unprecedented event -- a bud-killing freeze. This type of event had not occurred in the 11 years I have been in North Carolina. One grower thought he remembered a similar event happening 27 years ago. We do know that with this 2007 event, established blackberry growers were hit hard and yields were impacted. For University Research and Extension personal it was a learning experience and we now have more background information on how the blackberry plant responds to an early spring freeze. Following is an account of what happen and what we have learned.

Most plants grown in the temperate zones, including blackberries require a certain number of "chilling units " in order break bud and grow in the spring. By April 7th, blackberry plants in NC had accumulated between 950 to well over 2000 hours of "chilling units" (Table 1). For blackberries, the plants accumulate 1 chill unit each hour the temperature is below 7° C or 45° F. The chilling requirements of most blackberry cultivars are between 400 and 900 chilling units (or chilling hours). Therefore most blackberry cultivars in NC had met their chilling requirement and were ready to start growing. In blackberry fields the week prior to the freeze, buds was breaking the fruiting laterals began to elongate due to the unseasonably warm temperatures. There were even a few scattered king flowers were at popcorn stage on some cultivars. Then on the night of the temperatures of 20°F and below occurred across the state.

Table 1: Chilling units at various locations across North Carolina as of midnight April 7, 2007.

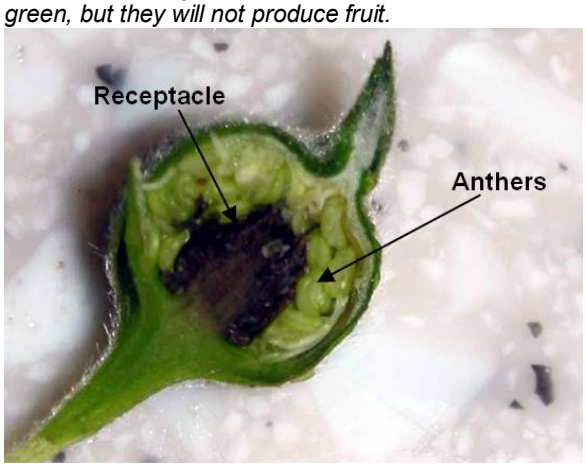
City	Region	No. of Chilling Units[1]
Castle Hayne	Coastal Plain	993
Kinston	Coastal Plain	934
Jackson Springs	Sandhills	958
Salisbury	Piedmont	1797
Asheville	Mountain	1944
Laurel Springs	Mountain	2217

[1] Based on a model that accumulates 1 chill unit when temperature < 7° C or 45° F. Chilling inception occurs at the first incidence of -2.2° C or 28° F. Data provided by State Climate Office of North Carolina.

Field visits 24-48 hours after the freeze confirmed that damage was significant and that very little crop if any would be produced in 2007. An example of the damage is seen in Figure 1. Notice that all of the flower buds are blackened in the centers. Some growers had sliced open the buds and found some green tissue, and thought the buds were still alive, but upon closer inspection, the receptacle (the part of the flower that develops into the fruit, was black and only the anthers were still green (see Figure 2)).

Figure 1: *Flower buds damage 24-48 hrs after freeze. Image below is a fruiting lateral with 2 buds sliced open longitudinally. Buds are at various stages of development, the largest (king) is at the tip of the lateral were all killed. (Photo courtesy R. Galloway).*

Figure 2: *Longitudinal section of blackberry bud. Note that the center (**receptacle**) is black. **Anthers** can still be green, but they will not produce fruit.*



Visits to farms and reports from Extension Agents indicated that freeze damage to the primary buds had been significant, and all emerged buds were completely dead. However, little or no damaged occurred to the canes or root system, so the plants were still alive. Within a 1-2 weeks after the freeze, "secondary" buds started emerging from the on the blackberry plants (Figure 3). These "secondary" buds were actually axillary buds at the base of the dead primary buds and are normally dormant.

Figure 3: *These "**secondary**" buds began to emerge 2 weeks after the freeze. Technically they are axillary buds at the base of the dead primary buds. These buds gave rise to a new flush of flowers and eventually developed into fruit. Note dead **primary** buds are still present.*

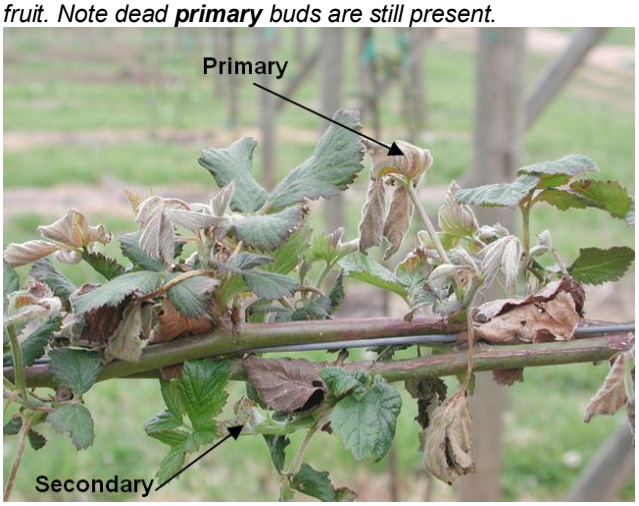
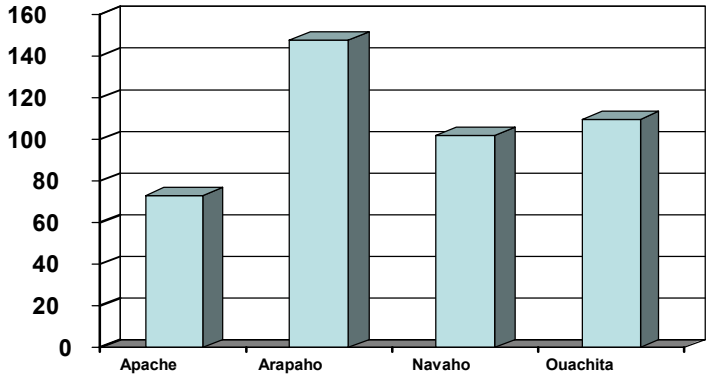


Figure 4: *Blackberry flowers in full bloom. Note the blackened centers of the flowers.*

These newly emerged buds produced flowers, some that were damaged (Figure 4) and others that developed into fruit. Flower counts from these buds show that cultivars varied in the number of flowers produced on this second flush of flowers (Figure 5). The cultivar Arapaho produced the largest number of live flowers/cane. However, this will not likely translate into the largest yields, because cane density/acre of Arapaho is lower than the other cultivars in the field this data was taken. Furthermore, we do not know how many flower buds on the primary buds were killed and how this damage impacts yield. Blackberry harvest is underway; yield data will be available later in this summer. However, early reports indicate that yields are 30% of normal.

Figure 5: *Number of live flowers/cane.*



We have learned much about the blackberry plant this year. We know that in NC most blackberry cultivars have met their chilling requirements and will break bud by early April. We know that a late season freeze can do significant damage to the blackberry crop, but the temperatures that we experienced did not kill the plants. In other parts of the country were blackberries were grown, the damage was much more severe and there was a complete crop loss. We were fortunate that in NC we did not experience a complete crop loss. We know that at 20°F, only the female portion of the flower buds are killed, the flowers will still bloom, but will not develop into fruit. We know that buds that are usually dormant will develop and produce a crop. However, the smaller yields will likely not make it a profitable crop this year for growers. Let's hope that the 2007 freeze was an isolated incident and we will not have to go through this again.

NC Bunch Grape 2007 Freeze Damage

Sara Spayd
Extension Viticulture Specialist
NC State University

Low temperatures in NC bunch grape vineyards hit temperatures as low as 14°F during the Easter weekend. All bunch grape vineyards polled to date in NC were below 28°F, a critical temperature for spring wood damage, for varying lengths of time.

Green tissue and bud losses: Chardonnay was at the 5th leaf growth stage in many vineyards. Other early breaking varieties were at varying degrees of development. Primary, secondary and tertiary buds on vines that had broken bud were killed if temperatures dropped below 23-24 °F. Amazingly, some green shoots survived temperatures of 23°F and most survived temperatures down to 24 °F. At 23 °F the irregular survival of green shoots was characterized by damaged phloem and epidermal tissues, while xylem tissues survived. Xylem tissues continued to pump water into otherwise dead shoots. In this instance, growers were advised to remove the "mostly" dead tissues. Where temperatures were below 23 °F, the injured vegetative tissue was allowed to dry up and fall off. There were varying degrees of injury to buds on later breaking varieties.

Wood damage: Although green shoot death was the most spectacular form of injury, the most serious injury was to woody tissues greater than 2 years old. One-year old spurs that had no living bud tissues and no potential for regrowth had healthy phloem, xylem and vascular cambial tissues. Generally, two-year old wood had little to no wood damage to these tissues. Wood greater than 3 years old had little to no live phloem and vascular cambial tissues. Occasional islands of green phloem and vascular cambial tissues can be found. Xylem damage was found in vineyards experiencing the lowest temperatures (14-18 °F). Wood damage was found from Henderson County in the west to Currituck County in the east and from Surry County in the north to Polk County in the south.

Crop loss: Most vines immediately re-grew new shoots. Vines greater than three years old broke lots of latent and crown buds from cordons and trunks. On many of the European wine grape varieties there is some level of fruitfulness in those buds. However, the degree of fruitfulness varies tremendously by variety. American grapes are not nearly as fruitful. Overall, my best guesstimate for crop loss is 40 to 60%, primarily because of the high proportion of Chardonnay grown in the state. Chardonnay yield should be down by 70 to 80%. Bloom was very irregular and the weather was hot and dry during much of bloom. Additionally, 20-40 thrips/cluster were found at bloom. Resulting scarring will increase the potential for berry splitting, and rot, as the berries develop. The hot dry weather will significantly reduce berry size in non-irrigated vineyards, further reducing yield. In general, cane pruned vineyards did not have cordons to generate growth from latent buds. Crop production from those vineyards in areas of lower temperatures will have a minimal crop.

Recovery: Growers were advised to leave as many growing points as possible on injured vines. Research from Cornell and Washington State Universities indicated that growing shoots produce auxins that stimulate regrowth of the vascular cambium, hence vascular tissues, from the shoot

towards the root. Removal of the shoot results in cessation of regrowth of the cambial tissue. Growers were also advised to use their irrigation systems in order to reduce water stress in injured vines. Vineyards with significant wood injury and little green shoot damage were advised to not over crop injured vines. Application of K and P fertilizers were recommended, but not N fertilizer.

Long-range outlook: Vine survival will depend on degree of injury and efforts made by vineyard managers to enhance the chances of trunk cambial regeneration. Those efforts include leaving lots of shoots, minimizing water stress, and monitoring crop loads. All vineyards with trunk damage, most vineyards in the state, should be developing sucker growth for potential trunk replacements. We will not know the full impact of the 2007 Easter Weekend Freeze for another 1 to 3 years.

Impact of the Easter Freeze on Muscadine Grapes in North Carolina

Connie Fisk, Muscadine Extension Associate,
Department of Horticultural Science, NCSU

The following is a summary of freeze reports that Dr. Barclay Poling, Bill Cline, Whit Jones and I have posted to the NCSU Cooperative Extension Service's Freeze Damage website (www.ces.ncsu.edu/disaster/freeze). The status of the muscadine crop and the extent of the damage we're seeing change constantly so be sure to check the website for the latest information.

During the weeks following the Easter weekend freeze, we have been involved in assessing cold injury in muscadine vineyards across the state, with most of our time spent in the severely hit counties of southeastern North Carolina. 'Carlos' broke bud in mid-March in these southeastern counties, and had reached first- to fourth-leaf developmental stages (with visible clusters), depending on vineyard location, by April 8th. Carlos was the variety that sustained the most damage and is the variety with the greatest number of planted acreage. Though we have been surprised by the fruitfulness of the base and latent buds that are breaking, Carlos yield may only be about 60% of normal this year and will also be low next year as a result of the damaged wood I will discuss below. Magnolia also had considerable damage in some vineyards, but most other varieties, including fresh market varieties, have very little damage because they are so much later than Carlos. Further inland, muscadine vines were not as far along developmentally and sustained only moderate bud/shoot injury by comparison to the southeastern counties in the state.

To summarize the damage we're seeing, on last year's growth (where this year's fruit should arise) the outer layers of tissue, including the phloem, vascular meristem and possibly the new xylem, are splitting and separating from the older xylem tissue. Even if new buds have broken on this damaged wood, we are seeing them collapse as the limited reserves in the tissue are depleted. On young vines in some vineyards we are seeing this same splitting of cordons and even some trunks (notably on vines in grow tubes). In the long run, cold-injured trunks and cordons will never recover, and though it is difficult to think right now about lopping off nearly an entire cordon on an injured 2- or 3-year-old muscadine vine, it is nonetheless an important step to take in fully restoring the muscadine vine's "food and water pipe system," as well as to prevent disease infection from crown gall and *Botryosphaeria*.

Our recommendations in April and May were to prune off the severely damaged wood and train a new shoot or sucker to replace what was lost. At this late date though we are encouraging growers to wait to perform any more hard pruning until the vines go dormant this winter. For those that did make severe cuts, based on feedback from growers with experience replacing damaged cordons and trunks, we feel that it is better to leave several new shoots or suckers during the growing season to compete with each other and control vigor. A grower in Bladen County found that he had much better winter survival when he allowed multiple shoots or suckers to grow

after making a large pruning cut into the trunk. In contrast, they just kept "losing vines" where they made a severe cut, and then tried to push just one shoot for the rest of the season.

Other recommendations include applying no more fertilizer so that these already fragile vines don't have trouble hardening off this fall. It is also important to minimize vine stress by making sure to control for weeds, insects and diseases and by supplying adequate irrigation.

Easter Freeze Report: Impact on 2007 Strawberry Crop in North Carolina

E. Barclay Poling,
Professor and Extension Specialist (Small Fruits)
Department of Horticultural Science,
NC State University

The North Carolina strawberry industry still managed to produce more than an 80 percent crop in spring 2007 despite the unprecedented Easter freeze (April 7-8), that devastated tree fruit, bramble, blueberry and grape crops in North Carolina. Perhaps the most important reason that the strawberry industry escaped with so little injury relative to other fruit industries in the state has to do with the fact that the strawberry is a *low-growing crop*, and the support of an ice-load from overhead sprinkling is not an important issue, as it often can be in tree fruit and vine crops where limb and shoot breakage are common occurrences when over-tree or over-vine sprinkling is attempted under high wind conditions. Unlike tall growing plants, the strawberry is also an ideal candidate for floating row covers which are being increasingly used by many strawberry growers in the North Carolina to substitute for sprinkling, or to supplement sprinkling under severe freeze conditions, such as those that occurred Easter weekend 2007 in the western piedmont and mountains of North Carolina. In these western sections of the state, very few strawberry growers escaped the Easter freeze without very serious damage. In Western NC, especially in strawberry growing areas north of Asheville, temperatures plummeted 10^{o}F Easter morning (08-April), and winds were "howling" all through the night.

High winds and temperatures in the mid-to-upper teens were also a major problem for growers in western piedmont areas such as Davidson County (Lexington) and Forsyth County (Winston-Salem). On several farms in this region, crop losses exceeded 50 percent because of "evaporative cooling" injury to open blossoms from sprinkler irrigation (winds were in excess of 10 MPH). Experience is often said to be a "good teacher", but this says nothing about experience being a kind teacher! And, strawberry growers using sprinkler irrigation in the windborne freeze conditions found *experience* to be a very cruel teacher! Fortunately, a number of growers in western sections of the state had heard about the merits of combining sprinkling with row covers under high wind conditions, and yields on these strawberry farms were substantially better than on farms where only irrigation was applied Easter weekend.

Over some 15 years of dealing with similar types of massive arctic freezes during the pre-bloom period in late winter (usually early March), we have noted that that winds will often significantly die down during the third night of an arctic freeze. And, in fact, the so-called *Easter freeze of 2007* "morphed" into a radiational frost over many eastern sections of the state (central piedmont, sandhills and coastal plain). Winds died down enough after midnight (Easter morning), that growers using only sprinkler irrigation were able save 90 percent or more of their open blossoms – blossoms that would have otherwise been killed without sprinkling, Unfortunately, lighter weight row covers (1.0 oz/sq yd), did not provide adequate blossom protection in areas that had minimum temperatures below 24 F -- which was just about everywhere in the central piedmont, sandhills and coastal plain. Again, the use of sprinkling over top of the row covers proved to be the best overall approach on farms with lighter weight row covers, or older covers that were in relatively poor condition. Good results were reported by growers using 1.5 ounce covers in areas that did not have minimum temperatures go below 22 F.

In conclusion, strawberry acreage in North Carolina has been inching up again in recent years, and the National Agricultural Statistics Service, USDA, estimated North Carolina acreage to be 1500 acres in 2005, and I would conservatively estimate that about 1700 acres were planted in late summer/fall 2006 for the spring 2007 crop. With an estimated overall statewide crop reduction of about 20 percent due to the Easter freeze, this would mean that the state had potential for an approximate 25.5 million pound crop (assuming a 15,000 pounds per acre average)[1], but only produced about 20.4 million pounds, or a loss in revenue to state growers of about $4.8 million dollars, if you assume an average blended price for U-pick and ready-pick of $0.95 per pound.

[1] The National Agricultural Statistics Service, USDA, used a 15,000 lb/acre average for North Carolina in 2005.

Small Fruit 2007
Freeze Update – South Carolina

Powell Smith

Strawberry – Strawberry plantings ranged from extremely hard hit in the upstate and upper midlands to no damage in some areas of the midlands and lower state. In the upstate, the most severe damage came where frost protection systems were poorly designed for volume and coverage or in very exposed areas where the wind displaced the sprinkler pattern. Using row covers with the water protected the crop well in the upstate where this was practiced. Row covers alone did a good job of protecting the crop in the middle and lower portions of the state. Even in the lower parts of the state, some damage was incurred when only frost protection watering was used unless the planting was well protected from the wind. Due to the amount of acreage and damage in the upstate, the statewide damage estimate is in the range of 15 – 20% loss.

Brambles – Most bramble plantings in the upstate had tight enough blossoms to avoid damage except on some exposed tips. In the midlands where many varieties had some bloom and partially open blooms, some damage was incurred. Losses were generally minor in the midlands, since it appeared that the blooms recovered or bloom returned. In the lower state, the blackberry crop was undamaged. Statewide estimate of damage due to freeze is < 5%.

Blueberry – Throughout the state, losses to the blueberry crop were severe. Any high bush types were completely frozen out as were the early rabbiteye varieties. Some of the later rabbiteye varieties particularly in the lower state will bear some fruit. Few if any growers in SC use frost protection on blueberries, so I can't report on any successes or failures in the area. Statewide estimate of freeze damage is around 75%.

Muscadine – Little damage was incurred on muscadine in SC. In the northern and northwest part of the state some new growth was damaged in exposed vineyards, but the damage did extend down the cane far enough to damage developing fruit buds. Bloom was good and most vines are showing good fruiting. In the lower state, some vineyards are not setting fruit as well as usual. Overall damage was minimal probably < 5%.

Bunch/Wine grapes – acreage is minimal with no report for these crops.

Easter Freeze Damage on Bunch Grapes in Georgia

Phil Brannen

In Georgia we did have a substantial "hit" on several varieties, but the Chardonnay was largely decimated, due to the stage of development at the time. In some cases, the cordons of Chardonnay were killed back to the main trunk, and I am concerned that we will have follow-on dieback diseases which might be caused by Botryospaeria or other pathogens. With this type of damage, it is unlikely that fungicides would help to prevent stress pathogens from attacking the vines; if we see these pathogens starting to invade, then we would need to cut below the damaged tissue and train up new shoots or trunks. I also suspect that crown gall will be more prevalent on numerous varieties in the coming year, and there is little we can do about this.

On Chardonnay and Suwannee in their second year of growth, we have observed death of the trunks -- complete death back to the root stock. In some cases, new shoots are forming from the rootstock, which essentially renders the plants useless. In other cases, shoots are coming from the graft union area, but it is difficult to discern whether they are scion or root stock.
A high percentage of the crop was damaged in Georgia, but it is highly variable relative the varieties and stage of seasonal development. Yield losses are estimated to be in the range of 60 to 70%. With this type of freeze, even when measures were taken to protect the crop, they were rendered ineffective.

Easter Freeze Impact on Small Fruit Crops in

TN-David Lockwood

Fruit crops in Tennessee were devastated by the freezes during the period from April 4 through April 8. During this time period, we experienced a classic advective freeze. As the cold air system moved across the state, temperatures droped rapidly and stayed low for a 5-day period. At our Highland Rim Research and Education Center in Springfield, TN (about 30 miles north of Nashville), it was 83 degrees

F at noon. By midnight, the temperature had dropped to 29 F. Lows of 19 F were recorded for the next two nights and below freezing temperatures occurred for five straight nights. Conditions throughout most of this time included cold temperatures (Blue Ridge, GA recorded a total of 27 hours straight with temperatures below freezing), winds often as high as 25 to 35+ mph, very low dewpoints and overcast skies. During the final day of the cold event, the wind slackened and we had a radiation frost. Based on previous experience with advective freezes, normal active frost control techniques for most fruit crops would have been ineffective and would have caused more damage in some cases therefore most growers did not utilize them. Use of floating row covers and overhead irrigation to protect the strawberry crop were effective due to the low-growing nature of the crop and soil temperatures in the 50 degree F range.

Here is an update on the status of small fruit crops in TN as a result of the Easter freeze:

Strawberries (plasticulture):
Damage ranged from about 20 to 60 percent crop loss. The range of loss for growers using both overhead irrigation and row covers was in the range of 20 to 40%. With irrigation alone, losses exceeded 60% of the expected crop. There are about 400 acres of plasticulture strawberries being grown in Tennessee. Loss in revenue to growers is estimated at $1,400,000.

Strawberries (matted row):
Where growers utilized overhead irrigation to protect the crop, losses still accounted for nearly 60 to 70%. Fruit size was reduced dramatically and the duration of harvest was less than half of normal. Commercial matted row strawberry production accounts for less than 100 acres in the state and the estimated loss to growers is about $230,000.

Blueberries:
Both highbush and rabbiteye blueberries suffered a total crop loss in all parts of the state. Blueberry acreage in Tennessee is estimated to be about 250 with a significant portion of this being young plantings which have not reach full production.

Blackberries:
The blackberry crop was reduced by an estimated 60% due to the freeze. Further reduction in yields can be attributed to the extended drought resulting in smaller fruit and an abbreviated harvest. Blackberry acreage across Tennessee is estimated to be about 150 acres.

Grapes:
The grape crop is estimated to be about 20% of normal due to the freeze. Virtually all of the commercial acreage goes to wine. The estimated loss to growers is about $1,000,000. Tennessee has about 450 acres of producing vineyards. Severe vine damage occurred during the freeze with losses in vinifera plantings is estimated to be upwards of 80% or more. Losses with hybrid and American cultivars were substantially less, although the need for cordon and trunk replacement will result in reduced yields for the next couple of years.

Taking AIM at Weeds

W.E. Mitchem
Extension Associate
Orchard and Vineyard Floor Management
N.C. State Univ., Clemson Univ.,
and Univ. of GA, Cooperating

Aim (carfentrazone) is a selective, postemergence herbicide that has been labeled for use in numerous fruit and vegetable crops. Aim has a favorable environmental profile and is very safe to the applicator and has a short pre-harvest intervals for nearly all crops in which it is registered.

Aim is registered for use in blueberry, caneberry, grape, and strawberry crops and the rate range along with the pre-harvest interval are given in table1. Aim must be applied in combination with a non-ionic surfactant (1 qt/100 gal of spray solution) or crop oil (1 to 2 gal./100 gal. of spray solution). The addition of ammonium sulfate with a non-ionic surfactant or crop oil concentrate will increase herbicide activity. Although Aim controls only certain weeds and is a selective herbicide it can be injurious to the crop if it is allowed to contact green foliage or immature, green bark of desirable plants. Extreme care must be taken to prevent contact with crop foliage, immature woody stems or green stems, and fruit so that injury will be prevented. Aim may be tank mixed with preemergence herbicides to provide postemergence control of susceptible weeds.

Table 1: Rates and Preharvest Intervals for Small Fruit Crops

Crop	Rate	PHI (days)
Blueberry	1 to 2 fl. oz./A	0
Caneberry	0.8 to 2 fl. oz./A	15
Grape	1 to 2 fl. oz/A	3
Strawberry	0.8 to 2 fl. oz./ A as a hooded spray	0

Although Aim does not control grass weeds, it controls numerous problematic broadleaf weeds (see Table 2.). In order to successfully control broadleaf weeds with Aim growers must apply the herbicide timely to weeds 4" tall or less.

Table 2: Aim Rate and Susceptible Weeds

Rate	Species Controlled
0.8 fl.oz./A	lambsquarters, redroot pigweed
1 fl. oz./A	Nightshade, morningglory, cocklebur, spiny amaranth, carpetweed, tropical spiderwart, groundcherry, jimsonweed, velvetleaf
1.6 fl. oz./A	Palmer amaranth, prickly lettuce, wild mustard

The addition of Aim at 0.5 to 1.1 fl. oz/A along with ammonium sulfate to glyphosate will result in better control of some weeds like Carolina geranium, annual morningglory, and small flower morningglory.

UGA Blueberry Field Day a Great Success

D. Scott NeSmith, Professor
Department of Horticulture
The University of Georgia

The 2007 UGA Blueberry Field Day was held May 3 at the Blueberry Research Farm near Alapaha, Ga. More than 85 attendees enjoyed food, fellowship, and interaction with UGA Specialists and Agents during the twilight hour in the "outdoor classroom". Dr. Scott NeSmith and Dr. Gerard Krewer hosted the event. Participants were able to see firsthand ongoing research and field demonstrations related to Georgia's blueberry industry. Special guests included CAES Dean Dr. Scott Angle, CAES Asscoiate Dean of Research Dr. Bob Shulstad, and Horticulture Dept. Head Dr. Doug Bailey.

We wish to especially acknowledge our sponsors for the event. These were:

Batten Tractor Company
Koppert Biological
Michigan Blueberry Growers' Association
Southern Ag & Turf
SunnyRidge Farm, Inc.

These sponsors made possible an outstanding meal of good ol' southern smoked pork with all the trimmings. There were demonstrations of equipment, irrigation systems, and bumblebees for pollination.

Prior to the twilight meeting, several UGA Blueberry Specialists and Agents were able to have an informal meeting and discussion to update one another on happenings in the Georgia industry. A special thanks goes out to Mr. Shane Tawzer for his hard work in having the Blueberry Research Farm in the very best possible condition for the Field Day.

Gerard Krewer and Scott NeSmith, hosts of the 2007 UGA Blueberry Field Day

Blueberry Field Day participants viewing exhibits of farm equipment and bumblebees for pollination.

Participants observe an irrigation sprinkler demonstration.

Phil Brannen discusses fungicide research with growers.

UGA Blueberry Agents and Specialists discuss industry issues.

Bramble Chores
Summer 2007

Gina Fernandez
NC State University, Raleigh, NC

Plant Plant growth and development

- Fruit development.
- Rapid primocane growth.
- Floricanes senesce.
- Primocane fruiting types flower and produce fruit.

Pruning and Trellising

Erect types:

- In warm climates with a long growing season, hedge (tip) the new primocanes when they are about 6-12" below the top wire of the trellis to encourage lateral branching. Continue hedging at monthly intervals to maintain desired branching and height of canopy (laterals should reach top wire).
- colder climates, tip primocanes once when they are about 2 – 3 ft. tall to encourage lateral branching.
- Prune out spent floricanes after they have produced fruit, do not thin out primocanes until mid-to late winter.
- Train primocanes to trellis to minimize interference with harvest. Shift trellises or V trellises make this relatively easy.

Trailing types

- Train new primocanes to middle of trellis, or on the ground in a weed free area or temporarily to trellis outside of fruiting area (depends on trellis type).
- Cut back side shoots to 18" (after dormancy in cold climates).
- Remove spent floricanes after harvest.

Weed management

- Mow along side of row to maintain the width of the bed to 3-4 ft.
- Weed growth can be very vigorous at the same time as the bramble crop peaks.
- Weed control is best done earlier in the season before harvest commences.
- Mow middles regularly to allow pickers to move through rows easily.

Insect and disease scouting

- Scout for insects
- Raspberry crown borer (canes girdled and wilt)
- Psyllid
- Two spotted spider mite
- June beetle
- Scout for diseases
- Botrytis

- Late rust
- Sooty blotch
- Orange rust
- Powdery mildew

Water management

- Bramble plants need about 1"-2" water/week, and this is amount is especially critical during harvest.
- For blackberries (not raspberries) in warmer climates only, consider installing an overhead system for evaporative cooling to reduce sunscald. Turn on once or twice a day from 10 am to 3 pm for short periods of time (approx. 15 minutes).
- Give plants a deep irrigation after harvest.

Nutrient management

- Take leaf samples after harvest and send to a clinic for nutrient analysis. Do not fertilize with nitrogen at this time of the year.

Harvest and marketing

- The busiest time of the year for a blackberry or raspberry grower is the harvest season. Each plant needs to be harvested every 2-3 days. For larger plantings, that means fruit is picked from some part of the field every day of the week.
- Pick blackberries when shiny black for shipping. Those that are dull black are fully ripe and suitable for PYO only.
- Pick directly into clamshells with absorbent pads OR for PYO use soft drink flats.
- Keep harvested fruit in shade and move into coolers as soon as possible to lengthen the shelf life of the fruit.
- Use forced-air precoolers for best removal of field heat.
- Store at 32 to 34°F and 95% relative humidity.

Freeze excess fruit for jam, juice or wine.

Quarterly Strawberry Plasticulture Checklist

This checklist was originally developed for growers in North Carolina. You will have to adjust your work activities either earlier or later depending on your location.

Gina Fernandez

Summer (June-August)

- Clean-up fields after harvest
- Clean-up stand and fields
- Spray to kill spent plants with contact herbicide
- Remove and recycle plastic
- Send in soil sample for fall fertilizer recommendations
- Plant summer cover crop
- Order plants or tips
- If raising your own plug plants, organize your plug production set-up (irrigation, soil, flats, tips…)
- Plow in cover crop late summer
- Apply fall fertilizers as recommended
- Prepare fields for fumigation, allow adequate time for plant-back interval

Small Fruit News

Volume 7, No. 3 July 2007

Editor and Contributor..... Tom Monaco

Published is four times a year. Small Fruit News is available on the Southern Region Small Fruit Consortium (SRSFC) web site www.smallfruits.org. To subscribe to an electronic notification service of new Small Fruit News issues on the web, send your e-mail address to brendaw@uga.edu.