Small Fruit News

Vol. 18, No. 4 October 2018

Clemson University • Louisiana State University • North Carolina State University
The University of Arkansas • The University of Georgia • The University of Tennessee
Virginia Polytechnic Institute and State University

In This Issue

Downy mildew resistance to QoI fungicides is rampant in Georgia vineyards

Sarah Campbell and Phil Brannen
University of Georgia Plant Pathology Department

Georgia's wine grape industry is relatively young and fragile. Though vinifera and hybrid vineyards have been in production in Georgia for approximately 40 years, the industry has only shown significant growth in the last 10-15 years. Wine grapes are contributing significantly to the Georgia economy even though acreage pales in comparison to that of North Carolina and Virginia. Georgia vineyards are concentrated in the Valley and Ridge and Blue Ridge geographic regions of northern Georgia and the Piedmont of west Georgia. However, hybrid grapes are now being grown in the southern Coastal Plains, so wine grapes are actually becoming a statewide enterprise. Many grape species and hybrids share one significant issue in common – susceptibility to a disease called downy mildew. Arguably, downy mildew may be the most difficult to control disease in Georgia grapes, and this is true for most if not all of the Southeast.

Figure 1: *Downy mildew sporulation on young grape clusters (photo courtesy of C.F. Hong; University of Georgia Plant Pathology Department).*

Figure 2*. Downy mildew sporulation on the underside of leaves (left) and subsequent defoliation (right).*

Downy mildew is caused by the oomycete *Plasmopara viticola*. Though downy mildew is an important disease for grape growers worldwide, the southeastern environment is perfect for disease development – generally humid and wet for much of the growing season. *P. viticola* infects and reproduces on berries (Fig. 1), pedicels, and the undersides of grape leaves (Fig. 2), reducing photosynthesis and rendering the fruit unusable. In severe cases, leaf drop (Fig. 2) will decrease the vine's overwintering potential because of nutrient deprivation, which leads to winter injury/kill. Downy mildew also lowers yield and has a substantively negative impact on the resulting wine quality due to both direct (infected fruits) or indirect (reduced photosynthates and poor grape quality) effects.

Downy mildew thrives on *V. vinifera*, hybrids and even some natives, which account for most of the cultivars grown in Georgia's wine industry. To minimize downy mildew and other diseases, grape growers spray fungicides throughout the season and even after harvest (to protect leaves). Due to the season-long infection potential of *P. viticola*, vineyard managers may employ as many as thirteen to seventeen downy mildew sprays in any given growing year. Because of the numerous applications of oomycete-active materials applied, resistance can readily develop to different chemical classes utilized to control downy mildew.

Spraying fungicides with the same single-site mode-of-action active ingredient repeatedly selects for individuals who are less sensitive. These less sensitive individuals and their progeny remain in the vineyard and cause more damage – often as if no fungicide had been applied. Fungicide resistance in *P. viticola* is well studied for many classes of fungicides and a variety of geographic locations. The main classes of fungicides studied for resistance are the quinone outside inhibitors (QoI), carboxylic acid amides (CAA), phenylamides (PA), and cyano-acetamide oximes, all of which utilize a single mode of action to impede downy mildew (Gisi and Sierotzki 2008). These fungicide classes have been evaluated for grape growing regions in Europe, China, Japan, and the US. However, a study of fungicide resistance had not been conducted in Georgia.

In 2017, a survey of fungicide sensitivity was performed on downy mildew isolates from throughout the state. Leaves with downy mildew were collected from multiple commercial Georgia vineyards and tested for genetic mutations known to confer resistance and/or tested in bioassays to further confirm resistance. The main mutation known to cause QoI resistance is the G143A mutation, which is a point mutation in the cytochrome b gene that changes the resulting amino acid from glycine to alanine (Baudoin et al. 2007). This mutation is known to confer total resistance to the entire QoI fungicide class. The known mutations for CAA resistance, point mutations in the PvCesA3 gene, also show cross resistance among the CAA fungicides (Nanni et al. 2016; Zhang et al. 2017). The presence of these mutations was evaluated using PCR for the samples collected in 2017 and on DNA isolated from Georgia downy mildew samples collected in previous years by Cheng-Fang Hong, a Ph.D. student at the University of Georgia.

To further confirm the molecular results for fungicide sensitivity, isolates were also tested against a discriminatory dose of a formulated commercial QoI and CAA fungicide in a leaf disc bioassay. The QoI active ingredient azoxystrobin (Abound) and the CAA active ingredient mandipropamid (Revus) were utilized. This bioassay was largely derived from the Fungicide Resistance Action Committee's (FRAC) microtiter plate test for fungicide sensitivity (Sierotzki and Kraus 2003). A bioassay test was also conducted against a range of fungicide concentrations of the PA fungicide mefenoxam (Ridomil), to determine

sensitivity of this class. Testing the PA fungicides against a range of concentrations is necessary, as no molecular markers for resistance have been identified. Results indicated that QoI resistance is widespread among *P. viticola* populations throughout Georgia (Table 1 and Fig. 1). However, neither CAA nor PA resistance was observed at any vineyard in Georgia (Table 1). This is fortunate, as CAA resistance has been found in Virginia and North Carolina within the last few years.

Table 1: Downy mildew resistance to QoI (Abound and Pristine; azoxystrobin and pyraclostrobin; FRAC 11), CAA (Revus and one component of Zampro; mandipropamid and dimethomorph; FRAC 40), and PA (Ridomil; mefenoxam; FRAC 4) fungicide classes in 2017 Georgia surveys.

Percent Resistance by County

		Bioassay			PCR	
County	N*	QoI	CAA	PA	QoI	CAA
Cobb	8 (1)	100	0	0	100	0
Colquitt	28 (1)	0	0	0	28.6	0
Fannin	8 (1)	100	0	0	100	0
Gilmer	9 (2)	100	0	0	100	0
Haralson	4 (1)	100	0	0	-	-
Rabun	8 (1)	100	0	0	100	0
White	13 (4)	100	0	0	100	0

*Number of isolates (vineyards sampled)

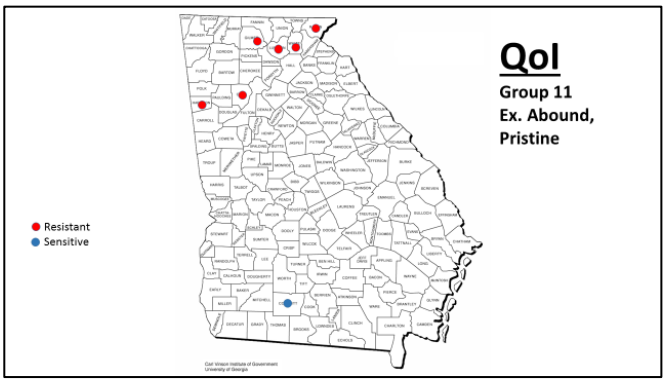

Figure 3: *Survey results by county of Plasmopara viticola (downy mildew) resistance to QoI (FRAC 11) fungicides in Georgia (2017).*

In addition to field surveys for downy mildew resistance, efficacy of eight different fungicides and two combinations (10 total treatments) were tested for downy mildew control at three locations (the University of Georgia Research and Education Center in Blairsville, GA and two commercial vineyards). Rates were calculated to correspond with a 50 gallon per acre spray volume, and applications were made at bloom, post-bloom, bunch closure, and second cover. Treatments included: (1) Abound, (2) Captan, (3) Pristine, (4) Prophyt, (5) Revus, (6) Revus Top, (7) Ranman, (8) Zampro, (9) Prophyt + Captan, and (10) Prophyt + Ranman.

In these trials, fungicides separated into three efficacy categories: (1) high efficacy – Revus, Zampro, Revus Top, Prophyt + Captan and Prophyt + Ranman; (2) good efficacy – Ranman, Captan, and Prophyt; and (3) no efficacy – Abound and Pristine (essentially the same as an untreated control) (Fig. 4). Downy mildew from these sites showed significant resistance to the QoI fungicides, as evidenced by the G143A mutation in the mitochondrial genome and bioassays. These trials further clearly document field resistance of downy mildew to the QoI fungicides azoxystrobin (Abound) and pyraclostrobin (Pristine) at these sites and confirm the total lack of activity by these fungicides in most sites in Georgia.

Figure 4: *Efficacy (disease severity response as measured by the area under the disease progress curve [AUDPC]) of downy mildew active materials averaged across three trial sites in 2017. The QoI-containing products Abound and Pristine did not provide downy mildew control, and all three sites experienced a "field failure" where these materials were applied. Ranman, Captan, and Prophyt provided good control, but it is advisable that these materials be utilized in tank mixes such as Prophyt + Captan or Prophyt + Ranman for optimal efficacy and resistance management.*

In conclusion, resistance to the strobilurin (quinone outside inhibitor [QoI]; Fungicide Resistance Action Committee [FRAC] class 11) is widespread, and these fungicides (Abound, Pristine, Sovran, Flint), when utilized for control of other diseases, should always be mixed with mancozeb (early season) or Captan products at a minimum to increase or provide downy mildew control. Ridomil (mefenoxam) is still active, as is Revus and Zampro. Neither mancozeb nor Captan products are known to develop resistance, so maximum use of these products for downy mildew management should be encouraged. For the other classes with activity against downy mildew (Table 2), it is recommended that vineyard managers limit themselves to one application per season when possible – targeting periods with increased and sustained precipitation. Rotation among all active chemical classes will require producers to purchase multiple chemicals that will be utilized only once per season, but alternation of chemical classes is critical to maintaining these fungicides for years to come. We have already essentially lost the QoIs, and we simply can't afford to lose more classes if we are to manage this aggressive disease in the future.

Table 2: List of downy mildew active materials, Fungicide Resistance Action Committee (FRAC) codes, and efficacy ratings with notes.

Fungicides	FRAC Code	Efficacy
Ametocradin + dimethomorph (Zampro)	40 + 45	+++++ Systemic
Azoxystrobin (Abound)	11	??? Systemic (Resistance prevalent; always mix with mancozeb or Captan)
Boscalid + Pyraclostrobin (Pristine)	7 + 11	??? Systemic (Resistance prevalent; always mix with mancozeb or Captan)
Captan	M4	++++ Contact protectant; combine with Phosphonates
Cyazofamid (Ranman)	21	++++ Locally systemic; combine with Phosphonates
Famoxadone + Cymoxanil (Tanos)	11 + 27	++++ Use with Captan or mancozeb (required)
Mancozeb	M3	++++ Contact protectant
Mandipropamid (Revus)	40	+++++ Translaminar protectant
Mandipropamid + Difenoconazole (Revus Top)	3 + 40	+++++ Translaminar protectant
Mefanoxam + Mancozeb (Ridomil Gold MZ)	4 + M3	+++++ Systemic + contact protectant
Phosphonates (Prophyt, etc.)	33	++++ Systemic (combine with Captan)
Ziram	M3	++++ Contact protectant
Zoxamide + Mancozeb (Gavel)	22 + M3	++++ Contact protectant fungicides

References

Baudoin, A., Olaya, G., Delmotte, F., Colcol, J. F., & Sierotzki, H. (2007). QoI Resistance of Plasmopara viticola and Erysiphe necator in the Mid-Atlantic United States. *Plant Health Progress*. doi:10.1094/php-2008-0211-02-rs

Gisi, U., & Sierotzki, H. (2008). Fungicide modes of action and resistance in downy mildews. *European Journal of Plant Pathology, 122*(1), 157-167. doi:10.1007/s10658-008-9290-5

Nanni, I. M., Pirondi, A., Mancini, D., Stammler, G., Gold, R., Ferri, I., . . . Collina, M. (2016). Differences in the efficacy of carboxylic acid amide fungicides against less sensitive strains of Plasmopara viticola. *Pest Management Science, 72*(8), 1537-1539. doi:10.1002/ps.4182

Sierotzki, H., & Kraus, N. (2003). *PLASVI microtiter*. FRAC.

Zhang, H., Kong, F., Wang, X., Liang, L., Schoen, C. D., Feng, J., & Wang, Z. (2017). Tetra-primer ARMS PCR for rapid detection and characterisation of Plasmopara viticola phenotypes resistant to carboxylic acid amide fungicides. *Pest Manag Sci, 73*(8), 1655-1660. doi:10.1002/ps.4506

Auburn joins regional small-fruit consortium

Olivia Wilkes

In a move aimed at advancing and promoting Alabama's berry and grape industries, Auburn University has joined the multistate Southern Region Small Fruit Consortium, a collaborative initiative that brings together producers, researchers and extension specialists to strengthen the South's small-fruit industries.

Desmond Layne, who came to Auburn in June as Department of Horticulture head, said Auburn is the eighth land-grant institution to join the regional consortium, which he helped establish 20 years ago while a faculty member and extension specialist at Clemson University. The small-fruit industry includes blueberries, blackberries, raspberries, strawberries, grapes and muscadines.

"As part of the team, Auburn can work with the other universities to address issues that face small-fruit growers in the region," Layne said, adding that multi-institutional collaborations will help make research proposals more competitive for grants from federal agencies and other funding sources.

Auburn's membership in the association also will enhance the educational training available to producers, Alabama Cooperative Extension System Director Gary Lemme said.

"Small fruits are a commercial commodity for farmers through farmers markets, U-pick operations and wineries and are a favorite of private gardeners growing fresh fruits for their family's table," Lemme said. "The consortium allows extension horticulturalists to exchange production and marketing research with colleagues across the region for the benefit of Alabama fruit producers and consumers." Layne said Auburn's involvement in the consortium should help improve small-fruit producers' profitability and the state's economy.

"We import a lot of fruit from other parts of the U.S. and other parts of the world," Layne said. "The more that we can grow here in Alabama, the more our local growers can have successful and profitable businesses to support their families."

Each member institution invests $35,000 annually in the consortium, and every state has four representatives, including one commercial grower, on the steering committee. Representing Alabama on the committee are Layne, Auburn horticulture professor and extension specialist Elina Coneva, regional extension agent James Miles and Morgan County producer David Reeves.

College of Agriculture Dean Paul Patterson called joining the consortium an exciting development for Auburn, its horticulture department and Alabama producers of small-fruit crops.

"We look forward to the collaborative opportunities this will bring for our research and extension teams and their peers throughout the Southeast," he said

Spring Forward with Fall PRE Herbicides

Wayne Mitchem
Extension Associate

If you grow blueberries, grapes, or blackberries you should really consider getting a head start on your spring weed control program with a fall preemergence (PRE) herbicide application. November is a great time to apply a fall PRE and the benefits can last well into next May.

We have done considerable work, most of which has been in peach orchards, applying PRE herbicides in fall and there are some real benefits. Fall PRE applications control winter annual weeds that we normally have to deal with in March when things really warm up and those weeds begin to take off. Not having to deal with those weeds in March can be beneficial. Glyphosate effectively controls most winter annual weeds in March, however due to crop sensitivity we do not recommend the use of glyphosate in blackberry and there are some concerns when it is used in blueberry. A fall PRE herbicide will maintain the herbicide strip weed free through March, offering some radiant heat benefit during spring freeze events and eliminating competition when crops break dormancy in late winter or spring. Having weed-free crops during this time allows other issues to be taken care of whether that be trying to finish up pruning, initiating fungicide programs, doing trellis work, or etc.

In most of the work we have done in western NC and on the "Ridge" (close to Augusta, GA) in SC a November application of a PRE with a non-selective POST herbicide (paraquat or glufosinate) generally delays the need for a spring herbicide application until early to mid-May. Our research has shown that length of residual into the spring is affected by herbicide choice. For example Chateau (flumioxazin), or Alion (indaziflam) provides longer residual control into the spring than simazine.

In looking at PRE herbicide options I think you have several choices. Chateau, Alion, Sinbar, or Simazine are all effective. The differences between them is how long they persist. Generally Alion, Chateau, and Sinbar will persist longer than simazine. Please keep in mind there are restrictions on rate, timing, crop age, etc that varies with crop so you will need to be aware of those differences that are listed on the herbicide label. **Sinbar cannot be used in grape plantings and glufosinate is not cleared for use in blackberry**.

Herbicide Options by Crop

Crop	Chateau	Alion	Simazine	Sinbar	Paraquat	Glufosinate
Blackberry	Yes	Yes	Yes	Yes	Yes	No
Blueberry	Yes	Yes	Yes	Yes	Yes	Yes
Grape	Yes	Yes	Yes	No	Yes	Yes

Please read the herbicide label and adhere to all restrictions for each crop. Sinbar is not registered for use in grapes. Glufosinate is not registered for use in blackberry.

Savannah – and Caneberries -- on my Mind

Don't miss the opportunity to attend the North American Raspberry & Blackberry Conference! This annual conference of the North American Raspberry & Blackberry Association (NARBA) comes to Savannah in January, 2019 in association with the Southeast Regional Fruit and Vegetable Conference (SRFVC). While NARBA has been coordinating the caneberry sessions in Savannah for many years, this year it brings its full national meeting, with a much-expanded program of educational sessions and the chance to network with others in the caneberry world from all over the country and around the world. NARBA's full conference was held in Ventura, California in 2018 and was last in Savannah in 2011.

The program starts with a "Fundamentals of Caneberry Production" workshop on Wednesday, January 9, followed by two full days of educational sessions in two concurrent tracks on Thursday, January 10 and Friday, January 11. Speakers include blackberry breeder John Clark from the University of Arkansas; food safety expert Elizabeth Bihn from Cornell; research/extension experts from Georgia, North Carolina, South Carolina, Arkansas, Oregon, Michigan, and New York; Georgia grower Steve McMillan (the "Grower

Spotlight"); a panel of young Southeastern growers, and many more. And there's a wide range of topics: SWD Control, Genomics, New Varieties, Primocane-fruiting Blackberry Management, Crown Blight & Cane Blotch, Tunnel Production, Black Raspberries, Red Drupelet Reversion, Harvest Prediction, and New Apps for Caneberries are only some of those on the program.

NARBA conference registration includes access to the huge SRFVC trade show and all SRFVC educational sessions in other commodities on Friday, January 11 and Saturday, January 12. Those who have attended the Savannah conference in the past should note that in order to participate in the caneberry sessions on Thursday this year, they will need to register for NARBA's conference, not the SRFVC.

To see the full program and access online registration, visit http://www.raspberryblackberry.com/2019-north-american-raspberry-blackberry-conference/. Please also let others you work with know about this conference. The Fundamentals workshop should be of particular interest to new and prospective growers and extension who work with growers but need to increase their expertise. Workshop registration is limited and pre-registration is required, full conference registration is not required to attend the workshop.

If you have questions, please contact NARBA at 919-542-4037 or info@raspberryblackberry.com

Grape Chores – November 2018

Cain Hickey
University of Georgia

Reflection on past: It was a variably rainy growing season throughout the southeastern US. The rain was more persistent throughout post-veraison in some locales relative to others. All will make the best of what this vintage gave them; this may mean that a greater amount of acid-forward, lighter wines will be made from 2018 fruit relative to drier years. It may be healthy to think that the 2018 vintage will produce *different* wines as opposed to *worse* wines relative to other years. Consumers are really the ones needing convinced. I suppose it will be important to educate in tasting rooms when some are surprised to see fewer "full bodied" reds from 2018. As we enter leaf fall and early dormancy, let's all try to maintain an objective mindset and keep in mind that growing seasons are highly variable in the southeastern US – future vintages are likely to be drier, and maybe some even wetter. We surely can use this vintage as another learning experience to help us through future challenging vintages. This grape chore list will last through January/February, when the next installment will be released through the Southern Region Small Fruit Consortium website (www.smallfruits.org).

1. **Update records and double check that you have recorded the crop yield and chemistry from all blocks and varieties.**

2. **Ordering vines for vineyard- or block-sized plantings.** It actually may be a bit too late to guarantee that a certain

cultivar will be available for spring 2018 planting. Nursery orders are best-placed about 18 months before planting date to increase the chances of getting the desired cultivars/quantities - especially with niche cultivars like Blanc du Bois, Lenoir, Petit Manseng, and Albariño. However, it is better to try and inquire today relative to tomorrow.

3. **Ordering materials for new vineyard.** Newly planted vineyards require several materials for efficient and successful establishment. Posts, staples, wires, grow tubes/vine shelters, training stakes, tying materials, irrigation tubing, herbicide, etc. are all necessary to have on hand when planting a new vineyard. Some materials are more important to have on-hand pre- relative to post-planting, but why wait to order when you know you will need certain materials anyway?

4. **Identify systemically-infected vines and flag / rogue out *before* leaf fall**. Foliar symptoms of vines infected by bacteria, viruses, and phytoplasmas can only be visualized before leaf fall. Thus, if it hasn't been done already, walk your vineyard and identify and flag symptomatic vines. Vines from Georgia vineyards can be tested for PD in the White and Lumpkin County, GA Extension offices. There are currently limited remedial treatment options for vines infected by bacteria, viruses, and phytoplasmas except to monitor and control potential vectors, and to rogue out infected vines to limit local inoculum source. Like in 2017, we have seen many cases of Pierce's disease (PD) here in Georgia this year, and this is likely due in no small part to the mild "winters" we have recently experienced. Our current recommendations for Pierce's disease is to immediately rogue out the symptomatic vines.

5. **Post-harvest disease management.** Post-harvest disease management aims to maintain carbon assimilation before leaf fall, when the canopy is transporting mineral nutrients and carbon to the permanent vine structures. The primary culprits of diseased canopies are downy and powdery mildew. How do you know if you need to spray post-harvest fungicides? My two cents are that if you have clean foliage going to into harvest, then it may not be necessary to spray fungicides after harvest. However, if your disease pressure is high, then spraying appropriate fungicides may help maintain foliar health to maintain photosynthesis. One or two post-harvest / pre-leaf fall fungicide sprays are likely sufficient to maintain canopy health and prevent excessive inoculum buildup.

6. **"Winterize" equipment.** Take down bird netting and store so that it can be easily deployed next season when the bird pressure begins. "Winterize" (clean, grease, etc.) tractors and other mechanical and manual vineyard and winery equipment (picking bins, hedgers, mulchers, mowers, sprayers, picking shears, appropriate winery equipment).

7. **Evaluate trellis integrity and repair.** The trellis has taken a beating and has supported a lot of weight throughout the season; this is particularly true in locales affected by Hurricane Florence or Michael. Check for broken posts and trellis wires and repair or replace them before next spring.

8. **Evaluate missing vine number and order replants.** You may have already pulled vines out due to infection or physical damage, general undiagnosed poor/weak growth, or vine death. Walk

the vineyard and count missing vines and order replants where necessary.

9. **Reflect on the season and talk to your regional colleagues – both industry members and extension personnel.** What went right? What went wrong? Be prepared for next season by developing a plan to fix the "wrongs" and re-implementing the management strategies that worked well. It helps to talk to neighbors and ask them their take on their season – they may offer advice and answer questions that will put you in a better position for success next year, and vice-versa.

10. **Dormant pruning.** Vines become dormant after the end of leaf fall. However, many may not start pruning until after Thanksgiving or even Christmas. For those who spur prune, "rough pruning" is a way to get a head start on final pruning. If rough pruning is practiced and brush is pulled from the trellis wires, the final prune will be a breeze as the short spurs will simply fall out of the trellis onto the vineyard floor. Rough pruning to 5 to 10 node-spurs allows the grower to delay the final prune to late winter / early spring to assess bud damage and the risk of spring frost. Some "delay prune" by waiting until late winter / early spring before even starting to prune. This is an attempt to force bud break on the apical bud positions of the dormant cane before those on the basal positions, hence potentially reducing the risk of spring frost damage to the basal buds (i.e. those that will be retained. We have seen mixed reviews with delayed pruning as it puts growers "behind the eight ball" to finish pruning while several other seasonal tasks are getting underway – it always comes on too fast! If cane pruning, there is not much logic in delayed pruning, and *certainly* not much logic in "rough pruning" (i.e. don't prune the canes you intend to lay out!). Here is a video link to a recent talk on preliminary findings from a delayed pruning field trial in Georgia-grown Chardonnay: https://site.extension.uga.edu/viticulture/2018/10/uga-horticulture-seminar-on-delayed-pruning-in-chardonnay/

11. **Attend conferences and workshops.** The dormant season is a good time to get out and learn from other industry members and university personnel. The vineyard requires less timely inputs from managers during the dormant season and is why most major industry conferences are held between now and March. Here are a few regional conferences in the near future:

    a. Surry Community College's Southeastern United Grape and Wine Symposium – the week of November 5th (main conference on November 7th).
        i. http://ncviticulturecenter.surry.edu/symposium
    b. Southern Regional New Grape Grower's Conference (presented by UGA, NC State, and Virginia Tech) – December 11th in Athens, GA and December 12th in Asheville, NC.
        i. https://site.extension.uga.edu/viticulture/2018/11/southeastern-regional-new-grape-growers-conference/
    c. Georgia Wine Producer's Annual Conference – February 4th and 5th in Braselton, GA.
        i. http://www.georgiawineproducers.org/2018-annual-meeting/

If you have not already done so, please subscribe to our extension viticulture blog for updates on timely vineyard management, events, regional weather, etc. https://site.extension.uga.edu/viticulture/

Fall 2018
Caneberry Chores

Gina Fernandez
Small Fruit Specialist
North Carolina State University

Many of us in the south are recovering from the wrath of Hurricanes Florence and Michael. In parts of eastern NC, soils were saturated with the storm, and then had additional flooding as the rivers continue to fill with water from the tributaries. There is some information in the blog post on how to dealing with flooded berry fields http://teamrubus.blogspot.com/2018/09/hurricane-florence-2018.html.

FALL

Plant growth and development

- ✓ Primocanes continue to grow but growth rate is slower
- ✓ Flower buds start to form in leaf axils on summer-fruiting types
- ✓ Carbohydrates and nutrients in canes begin to move into the roots
- ✓ Primocane fruiting types begin to flower in late summer/early fall and fruit matures until frost in fall
- ✓ Primocane leaves senesce late fall

Harvest

- ✓ Primocane-fruiting raspberry harvest
- ✓ Primocane-fruiting blackberry harvest

Pruning, trellising and tunnels

- ✓ Spent floricanes should be removed as soon as possible
- ✓ Optimal time to prune is after the coldest part of the season is over. However pruning can start in late fall if plantings are large (late winter for smaller plantings).
- ✓ Start trellis repairs after plants have defoliated
- ✓ Remove covers on three-season tunnels

Weed management

- ✓ Many summer weed problems can be best managed in the fall and winter using preemergent herbicides. Determine what weeds have been or could be a problem in your area. Check with your states agricultural chemical manual and local extension agent for the best-labeled chemicals to control these weeds

Insect and disease scouting

- ✓ Continue scouting for insects and diseases
- ✓ Remove damaged canes as soon as possible to lessen the impact of the pest
- ✓ Check the Southern Regional Bramble integrated Management Guide for recommendations http://www.smallfruits.org

Planting

- ✓ Growers in warmer areas (e.g. extreme southeastern NC) can plant into early December. Preparations for winter planting should have already been made. If you have questions about winter planting please contact your local county extension agent
- ✓ In cooler areas, prepare list of -cultivars for next spring's new plantings. Find a commercial small fruit nursery list at https://blogs.cornell.edu/berrynurseries/

Fertilizer

- ✓ Take soil tests to determine fertility needs for spring plantings.
- ✓ Non-nitrogenous fertilizers are best applied in the fall to established plantings.
- ✓ If soil is bare, plant an overwintering cover crop (e.g. rye) to build organic matter and slow soil erosion.

Marketing and miscellaneous

- ✓ Order containers for next season
- ✓ Make contacts for selling fruit next season

Make plans to attend Grower meetings! Blackberries and raspberries are part or all of these programs.

- **North American Raspberry and Blackberry Association/ Southeast**

Regional Conference and Tradeshow, Savannah, GA

- Sessions on blackberry, raspberry, and strawberry, blueberry, muscadines and more!
- January 9-12, 2019, at the Savannah International Trade and Convention Center

http://www.raspberryblackberry.com/2019-north-american-raspberry-blackberry-conference/

Key Resources:
Southern Region Integrated Bramble Management Guide:
http://www.smallfruits.org/assets/documents/ipm-guides/Caneberry-Spray-Guide.pdf

Southeast Regional Caneberry Production Guide:
https://content.ces.ncsu.edu/southeast-regional-caneberry-production-guide

Blackberry and Raspberry Grower Information Portal:
http://rubus.ces.ncsu.edu

Social Media links:
Twitter: @NCTeamRubus
Facebook : Team Rubus
Blogs: http://teamrubus.blogspot.com/

Small Fruit News

Volume 18, No. 4 October 2018

Editor and Contributor Wayne Mitchem

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.