

# Small Fruit News

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

## In This Issue

- 1 ..... LSU Joins Southern Region Small Fruit Consortium
- 1 ..... DID YOU KNOW that roses get gray mold, too?
- 2 ..... 'Paulk' Muscadine
- 3 ..... Blackberry Leaf Rust – Don't Let It Fool You
- 5 ..... Spring Caneberry (Raspberry and Blackberry) Chores 2017
- 7 ..... Strawberry Chores: April, May & June

## DID YOU KNOW That Roses Get Gray Mold, Too?

Madeline Dowling and Guido Schnabel  
Clemson University

Perhaps some of you bought roses on Valentine's Day for a special someone. Did you ever consider that these flowers need disease protection, just like small fruits? Actually, one of the most damaging diseases affecting roses is an enemy very familiar to many small fruit growers: the infamous gray mold pathogen, *Botrytis cinerea*. This pathogen infects the tender new flower tissue on roses in the same way it infects strawberry flowers.



## LSU Joins Southern Region Small Fruit Consortium

Last week Dr. Kathryn Fontenot contacted us with the exciting news that LSU would be able to join the Southern Region Small Consortium in 2017. The LSU Ag Center funded the membership for a five year commitment and hopefully the MOU with LSU will be signed within the week. The addition of LSU expands the number of member institutions to 7 which include NC State University, Clemson University, the Universities of Georgia, Tennessee, Arkansas, and Virginia Tech. I would like to thank Dr. Fontenot for her support and leadership in making this possible and we look forward to working with the faculty and agents associated with LSU.

Most roses are imported to the United States from Columbia, Ecuador, or Mexico, where they are grown in greenhouses. Flowers are often packed closely together, and disease can spread quickly, leading to epidemics. The same fungicides used on strawberry are often used on rose crops to prevent gray mold in greenhouses. However, gray mold's uncanny ability to develop fungicide resistance is a problem for rose growers as well as strawberry growers,

especially in locations where fungicide resistance management practices are not implemented.

According to Melissa Muñoz, who researches rose gray mold from Colombia (the largest exporter of roses to the United States), growers have to take extreme precautions to remove infected roses from shipments. Many good roses are discarded because of tiny spots of discoloration suspected to be *Botrytis* on petals. However, there is help in sight for rose growers. Dr. Guido Schnabel, in collaboration with Ms. Muñoz and Dr. Faust of the Clemson University Horticulture department, are working to provide disease and fungicide resistance management recommendations that will enable rose growers to reduce fungus pressure in greenhouses and make more informed decisions about when and what fungicides to apply.

So, the next time you buy a bouquet of roses, remember the effort required to produce those flowers and maybe you will appreciate their beauty even more.

## **‘Paulk’ Muscadine**

Patrick Conner  
University of Georgia – Tifton Campus

‘Paulk’ is a new muscadine cultivar released from the University of Georgia muscadine breeding program. ‘Paulk’ was selected in 2009 from a cross of ‘Supreme’ x ‘Tara’ made by Dr. Conner. ‘Paulk’ was tested as Ga. 6-2-26 in replicated trials in Tifton, Ga. and Wray, Ga. ‘Paulk’ was released in the spring of 2017 and a U.S. plant patent will be requested. ‘Paulk’ was named in honor of Jabob Paulk, owner and founder of Paulk Vineyards who was instrumental in the development of the muscadine industry in Georgia.

‘Paulk’ vines are self-fertile and do not need a pollenizer. ‘Paulk’ vine growth, as measured by

caliper, is similar to ‘Supreme’, but lower than some of the more vigorous cultivars such as ‘Hall’ and ‘Fry’. Paulk muscadine ripens in mid to late season (third week of August in Tifton, Ga.), which is a few days after ‘Fry’ and ‘Supreme’. Yields of Paulk are very good and are similar or better than other self-fertile cultivars and the high yielding female cultivar ‘Supreme’. Paulk produces a high percentage of usable yield with low incidences of berry rot and stem scar tears and splits (Table 1). Berries of ‘Paulk’ are round and berry weight (15.5 g) and diameter (30.2 mm) is excellent and larger than other self-fertile cultivars. ‘Paulk’ is the first self-fertile muscadine cultivar with a berry weight equal to ‘Supreme’. Soluble solids of the berry juice is similar to other cultivars tested (14-14.5). Flesh firmness is softer than ‘Supreme’ and ‘Lane’ and more like traditional muscadines such as ‘Fry’ and ‘Hall’. The color of ‘Paulk’ berries is purple, similar to ‘Supreme’, but with more noticeable lenticels. ‘Paulk’ berries have a longer pedicel than ‘Supreme’ (11.5 mm vs. 7.1 mm) allowing the picker to grasp individual berries near the pedicel rather than squeezing the berry end and pulling, which often results in split and torn berries.



**Figure 1:** ‘Paulk’ berries on the vine.

Symptoms of Pierce’s disease have not been observed on ‘Paulk’ at any location. Under a typical fungicide schedule, ‘Paulk’ was slightly susceptible to various fruit rots including bitter rot, ripe rot, and macrophoma rot. Infection levels were higher than ‘Supreme’ and ‘Lane’,

Table 1. Flower and fruit attributes of ‘Paulk’ and standard muscadine cultivars at Tifton, GA in the third through seventh years of growth (2012-2016).

Cultivar	Flower type <sup>c</sup>	Berry color	Avg. day of first harvest	Berry rot (%)	Berry stem scar split (%)	Berry stem scar tear (%)	Dry scar (%)	Berry wt. (g)	Berry diam. (mm)	Percent soluble solids of all harvests
Paulk	SF	Black	Aug. 20	8	4	11	85	15.5	30.2	14.2
Fry	F	Bronze	Aug. 16	16	18	34	48	11.7	27.4	14.0
Hall	SF	Bronze	Aug. 2	17	3	8	90	10.2	26.0	14.5
Lane	SF	Black	Aug. 3	4	22	23	55	9.6	25.6	15.3
Supreme	F	Black	Aug 18	4	13	29	59	15.1	29.9	14.3
Tara	SF	Bronze	Aug. 4	10	5	12	83	10.8	26.4	13.9

<sup>c</sup>(SF) hermaphroditic, (F) female

but less than the bronze cultivars (Table 1). Only limited data is available to determine the cold hardiness of ‘Paulk’ vines, and large plantings should not be made in the northern muscadine regions until more data is available.



Figure 2: ‘Lane’, ‘Paulk’, and ‘Supreme’ berries in pint clamshells.

‘Paulk’ is recommended as a main-season purple muscadine for the fresh market. Size and appearance of ‘Paulk’ is very similar to ‘Supreme’, the leading purple fresh market cultivar. ‘Paulk’ is superior to ‘Supreme’ in that it has self-fertile flowers and less incidence of tearing and splitting at the stem scar. ‘Paulk’ is expected to be licensed to several nurseries in the spring of 2017, with plants available for sale in the spring of 2018. For a list of licensed nurseries contact Dr. Patrick Conner (pconner@uga.edu).

## Blackberry Leaf Rust – Don’t Let It Fool You

Phil Brannen, University of Georgia  
John R. Clark, University of Arkansas

When someone mentions rust to blackberry growers, what usually comes to mind is the devastating orange rust disease. However, there are two rust diseases observed in southeastern blackberry production – orange rust and cane and leaf rust. It is very important that one be able to distinguish the two, as the control recommendations are very different. Both require a comprehensive spray program for management (see the IPM guide at the [www.smallfruits.org](http://www.smallfruits.org) website). However, orange rust is systemic, meaning that once observed, complete destruction of the plant is necessary to prevent further spread. Navaho is usually the most-often affected variety, so those growing other varieties seldom see this disease. Cane and leaf rust, though important, is not nearly as devastating. With that said, if producers misidentify cane and leaf rust as orange rust, they will often destroy plants that could readily live and produce blackberries in the current and future seasons – a critical and unrecoverable mistake.

Orange rust is caused by the fungus *Gymnoconia nitens*, but the fungus

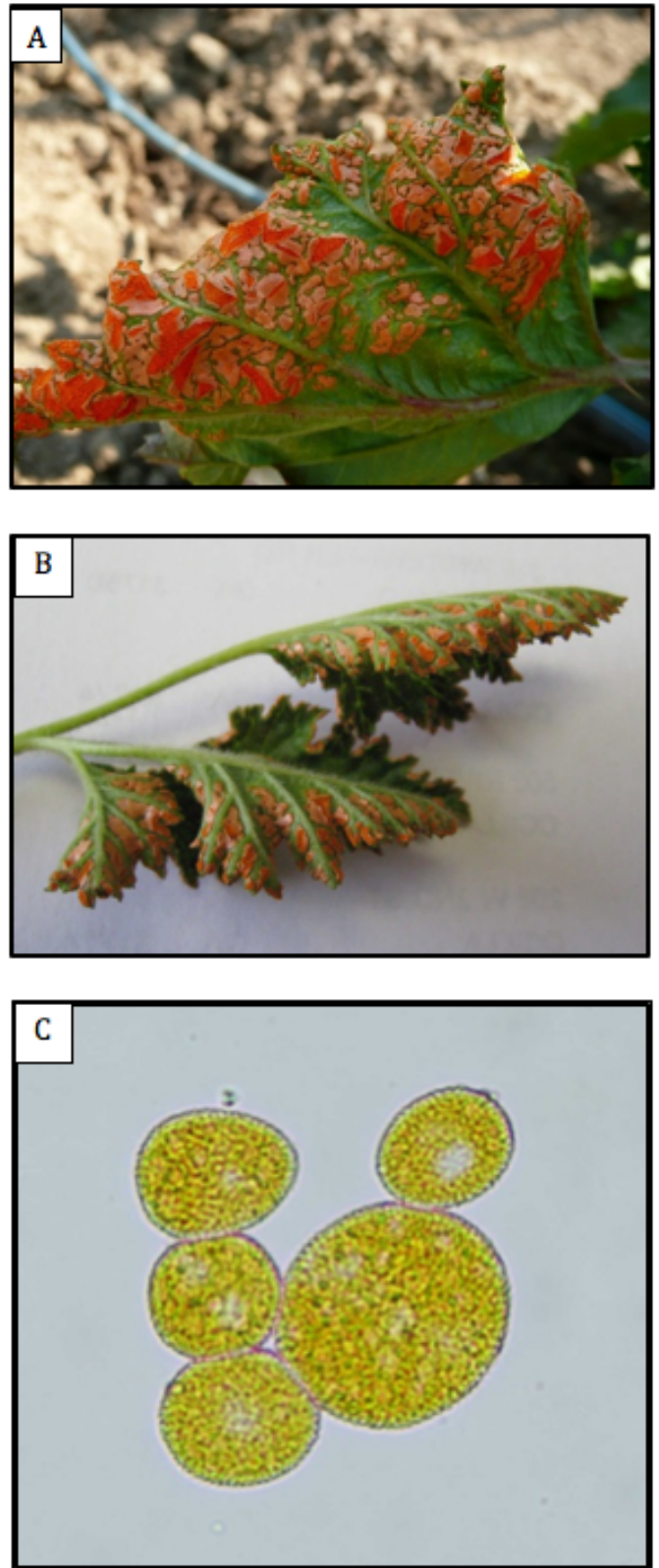


*Arthuriomyces peckianus*, causing identical symptoms, may also be the cause of the disease. We most often see *G. nitens*. Orange rust is usually first observed in the early season at primocane emergence and bloom. The most striking symptom is very bright orange, blister-like sporulation, seen on spindly, elongated shoots near the base of plants. The sporulation is more pronounced on the leaf margins, as opposed to the center. Leaves affected by the fungus are also misshapen or often cupped (Fig. 1 A and B).

More often, producers observe cane and leaf rust later in the growing season, often during harvest and onward into the summer and fall. However, with warmer winters in recent years, rust symptoms are now being observed on old leaves and earlier than normal on young leaves – confusing producers who assume they have orange rust due to the timing. Cane and leaf rust is caused by the fungus *Kuehneola uredines*, and it is generally seen first on the undersides of floricanes leaves in the fruiting area of the canes (Fig. 2 A). It can also be seen on primocanes later in the summer.

There are several differences in the symptoms observed with the two different rusts. The orange rust leaf lesions are generally orange, whereas the cane and leaf rust lesions are more yellow in appearance. However, this is not a great way to discern between the two, as color will vary. As mentioned above, the orange rust fungus produces blister-like lesions that distort the leaf at the margins, while the middle of the leaf may not show symptoms or fungal structures. With cane and leaf rust, the pustules are spread throughout the leaf, and they do not tend to distort the leaf; in addition, cane lesions can also be observed (Fig. 2B). The most definitive way to distinguish the two is by spore type, and a compound microscope is required for this. Orange rust spores are generally round with lobed margins (Fig. 1C), as opposed to the irregularly shaped and spiny spores of cane and leaf rust (Fig. 2C). Many county agents now have microscopes in their offices, and if not,

they can readily send leaf samples to various diagnostic clinics for microscopic confirmation.



**Figure 1:** Orange rust seen with very distinct orange sporulation on the undersides of leaves (A and B). Young, infected primocanes are often stunted. Leaf lesions are blister-like in appearance, and they are more pronounced on the periphery of the leaf, as opposed to the leaf center. Spores are generally round with lobed margins (C), as opposed to spiny.



**Figure 2:** Cane and leaf rust. Lesions are found throughout the underside of the leaf, and sporulating lesions are generally yellow in appearance and do not distort the leaf (A). Lesions are also found on canes (B), and spores are more irregular in shape with spiny projections (C).

Control of both of these rust diseases is largely accomplished through use of chemical fungicides. Again, recommendations are found in the caneberry IPM guide found at [www.smallfruits.org](http://www.smallfruits.org). Application of fungicides from early bud break through harvest are recommended. Mid-summer temperatures are not as conducive for orange rust development, but as fall temperatures drop, it is anticipated that rust may continue to infect. We are limited in the classes of chemistries with rust activity, but an alternation of demethylation inhibitor (Rally) and strobilurin (Abound, Cabrio, and Pristine) materials is recommended as part of a comprehensive disease management program for rusts and other diseases. Do not exceed label rates and follow all label recommendations when using these fungicides. Sprays should generally be made every 10-14 days if conditions are dry and 7-10 days if conditions are wet.

## Spring Caneberry (Raspberry and Blackberry) Chores 2017

Dr. Gina Fernandez, Small Fruit Specialist at NC State University

Spring 2017 is here early, chores and timing may be somewhat different in your area or for your cropping system. For IPM recommendations and general production practices, see the Southeast Regional Caneberry Integrated Management Guide. <http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2016/2016BrambleSprayGuide.pdf> The IPM guide above lists these stages of growth or planting age. This is the time of year we are now leaving (or have left a while ago!) the dormant period and by the time the next newsletter comes out, we will likely be harvesting in some locations.

Dormant (prior to budbreak)  
 Delayed dormant (swollen buds) to green tip  
 Shoots 6 inches long and before blooms open  
 Pre-bloom (when flower buds show white)  
 Early bloom (5-10%)

Full Petal  
Cover sprays  
Pre-harvest (14 days before anticipated harvest)  
Harvest

The SRSFC production practices are in the  
Regional Caneberry Production guide:

- [Southeast Regional Caneberry Production Guide](#) (PDF)
- [Southeast Regional Caneberry Production Guide](#) (Online Version)

Plant growth and development

- Plants deacclimate quickly
- Bud differentiation (additional flowers can be formed)
- Bud break
- Flowering
- Primocane emergence

Pruning and trellising

- Finish pruning and make sure all floricanes are tied to the trellis before budbreak
- Remove canes from field to minimize spread of diseases
- Rotate shift trellises to horizontal position before budbreak; rotate to upright position immediately after flowering.
- Prepare for flower to fruit monitoring (see <http://teamrubus.blogspot.com/2015/03/monitoring-flower-to-fruit-development.html> )

Weeds

- Weed growth can be very vigorous at the same time as the bramble crop peaks
- Weed control is best done earlier in the season, with pre-emergent herbicides before harvest commences
- Hand-weed perennial weeds in and around plots

Insect and disease scouting

- Growers with a history of cane diseases and/or mites often find that certain fungicides and oils are most effective just prior to bud break. The period of time in the spring when the plant is flowering is the most important season for control of insects and diseases.

Know what your pests are and how to control them. See the

Water management

- Test irrigation system and look for leaks
- Caneberry plants need about 1"-2" water/week. This amount will be especially critical during harvest

Nutrient management See Caneberry  
Production Guide

<https://content.ces.ncsu.edu/southeast-regional-caneberry-production-guide/fertility-management>

Marketing and miscellaneous

- Service and clean coolers
- Make sure you have enough containers for fruit in the coming season
- Prepare advertising and signage for your stand
- Contact buyers to finalize orders
- Hire pickers
- Prepare signage for field orientation; it is easier to tell pickers where to go if rows are numbered
- Check buds and canes for cold damage (27°F is temperature that kills all stages of flower buds see <http://teamrubus.blogspot.com/2016/04/damage-to-blackberry-flowers-at-27f.html>)
- Monitor and record peak flowering date for each variety every year. Then later during harvest, check your records for peak harvest of each variety. Over time, it will help you to determine when your peak harvest will occur.

## Strawberry Chores: April, May & June

R. Allen Straw, Virginia Cooperative Extension

### April

1. If you haven't already done so, kill the grass or cover crop in the row middles.
2. Maintain frost/freezing protection equipment. Have row covers in place and ready to deploy.
3. Continue drip irrigation. Possibly increase frequency to every other day. Possibly increase the water to 1.25 to 1.5 inches of water per acre per week.
4. Continue fertilization through the drip system. A rotation of calcium nitrate, potassium nitrate, and water soluble 20-20-20 or water soluble is generally recommended.
5. Continue tissue sampling. Send in tissue samples according to the lab recommendations every 14 days. Adjust fertility according to the tissue test results and lab recommendations.
6. Continue to scout fields for insects such as strawberry clipper, spittle bugs and two-spotted spider mites. Treat with appropriate insecticide if threshold levels are reached.
7. Continue to scout for diseases such as *Botrytis*, anthracnose, powdery mildew, leaf spots, phomopsis, etc.
8. Continue to make preventive fungicide applications on a weekly schedule.
9. Put out advertisement and signs. Continue posting crop updates on social media. Continue updating the message on voice mail. Provide crop information and encourage customers to call back or check social media for updates.
10. A week or so before beginning harvest, clean up row middles. A non-selective herbicide like Gramoxone applied with a shielded sprayer. Be careful to prevent herbicide contact with the foliage. Please do not use Roundup or glyphosate at this time, as crop injury may occur. Also, preemergence herbicides can be applied

at this time to prevent weeds from coming back. Always follow label directions.

11. Continue to remove weed escapes from plant holes.
12. If you mulch the row middles, it is time to apply mulch. Clean straw if generally recommended.
13. Maintain break/rest areas. Service sanitary facilities including hand wash stations, at least weekly.
14. Begin harvesting as berries begin to ripen.

### May

1. In colder regions, maintain frost/freezing protection equipment. Have row covers in place and ready to deploy. After chance of frost has past, remove frost/freezing equipment and row covers from the field.
2. Continue drip irrigation. If you haven't already done so, definitely increase frequency to every other day. Increase the water to 1.25 to 1.5 inches of water per acre per week.
3. Continue fertilization through the drip system. A rotation of calcium nitrate, potassium nitrate, and water soluble 20-20-20 or water soluble is generally recommended.
4. If desired, continue tissue sampling. Send in tissue samples according to the lab recommendations every 14 days. Adjust fertility according to the tissue test results and lab recommendations.
5. Continue to scout fields for insects such as strawberry clipper, spittle bugs and two-spotted spider mites. Treat with appropriate insecticide if threshold levels are reached.
6. Watch for picnic or sap beetles. They are attracted to the sugar in ripe and over-ripe fruit. If detected, consider spraying with bifenthrin or other short PHI insecticides. Always follow label directions.
7. Begin scouting for spotted wing drosophila. A yellow sticky trap positioned above a mixture of sweet red



wine and apple cider vinegar in a plastic cup with a lid, make a great attractant trap. Make sure to punch holes in the upper portion of the cup. When females are detected, begin spraying on a 5 to 7 day program with a rotation of a pyrethroid and Radiant. Always follow label instructions.

8. Continue to scout for diseases such as *Botrytis*, anthracnose, powdery mildew, leaf spots, phomopsis, etc.
9. Continue to make preventive fungicide applications on a weekly schedule.
10. Continue to remove weed escapes from plant holes.
11. Continue to post crop updates on Social media. Continue to update the message on voice mail. Provide crop information and encourage customers to call back or check Social media for updates.
12. Check and maintain inventories of picking containers.
13. Maintain break/rest areas. Service sanitary facilities including hand wash stations, at least weekly.
14. Begin/continue to harvest as berries ripen.

## June

1. Continue drip irrigation at 1.25 to 1.5 inches of water per acre per week.
2. On days over 85 degrees, consider running drip for 3 to 4 hours in the heat of the day to provide some evaporative cooling. This has been found to extend the harvest season for 1 to 2 weeks.
3. Continue fertilization through the drip system. A rotation of calcium nitrate, potassium nitrate, and water soluble 20-20-20 or water soluble is generally recommended. Stop fertigation a week or so before final harvest.
4. Watch for picnic or sap beetles. They are attracted to the sugar in ripe and over-ripe fruit. If detected, consider spraying with bifenthrin or other short PHI insecticides. Always follow label directions.

5. Continue to scout for spotted wing drosophila. A yellow sticky trap positioned above a mixture of sweet red wine and apple cider vinegar in a plastic cup with a lid, make a great attractant trap. Make sure to punch holes in the upper portion of the cup. When females are detected, begin spraying on a 5 to 7 day program with a rotation of a pyrethroid and Radiant. Always follow label instructions.
6. Continue to scout for diseases such as *Botrytis*, anthracnose, powdery mildew, leaf spots, phomopsis, etc.
7. Continue to make preventive fungicide applications as needed.
8. Continue to remove weed escapes from plant holes.
9. Continue to post crop updates on Social media. Continue to update the message on voice mail. Provide crop information and encourage customers to call back or check Social media for updates.
10. Check and maintain inventories of picking containers.
11. Maintain break/rest areas. Service sanitary facilities including hand wash stations, weekly.
12. Finish harvesting berries.
13. Sit back and count the money before you spend it on the next crop or another enterprise!!!

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