Small Fruit News

the Southern Region small fruits consortium

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Clemson University
NC State University
University of Georgia

In this Issue:

Research Reports

Evaluation of Southern Highbush Blueberry Varieties With and Without Pine Bark Mulch

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Introduction. Georgia blueberry growers have an increasing interest in production of Southern highbush (SHB) blueberries for the fresh market. This interest primarily stems from the fact that SHB blueberries ripen early in the season when fresh market prices are very attractive. One of the major limitations to successful production of SHB is identification of varieties that can be produced on a wide range of soils. Typically, SHB blueberries perform best when planted in spodic or high organic matter soils. Most Georgia growers do not have these soils readily available on their farms, and they have to resort to supplementing soil organic matter by mulching. The mulching product of choice is pine bark based material. Mulching is a rather expensive cultural practice, and growers need to make the practice result in highest possible revenues by using the most productive SHB variety possible. Alternatively, if growers knew of SHB varieties that perform satisfactorily in soils more suitable for rabbiteye blueberries, they could produce these without supplemental mulch.

In the past 5 to 10 years, numerous SHB blueberry varieties have been released from breeding programs across the Southeast, including varieties from Arkansas, Florida, Mississippi, and North Carolina. There is very limited, or no information, on how these varieties perform across Georgia. Information concerning the performance of these varieties on a wide range of soils and/or to mulching is also lacking. To this end, research evaluating the performance of SHB varieties on atypical SHB blueberry soils, with and without pine bark mulch, is greatly needed to better equip Georgia's growers in decision making for their SHB production operations.

Materials and Methods. This research was conducted at two locations: Alapaha and Griffin. These two areas represent very diverse geographic and environmental conditions. At each location 15 to 22 SHB blueberry varieties were planted with and without pine bark mulch in the winter of 1998. Soil at Alapaha was typical rabbiteye blueberry soil, being a well-drained soil, with a pH of 4.9. Soil in Griffin was a typical highly eroded piedmont soil with a pH of 5.2. Soil was bedded at Alapaha, but not at Griffin, and drip irrigation was used at both sites. Plots at each location were either mulched or not. Mulch treatments consisted of 3 to 5 inches of pine bark placed on the soil surface after planting. Some pine bark was also mixed in the planting hole in the mulched plots. Individual

plots were 3 plants of a variety, separated by a skip in the row. Row width was 10 ft at each location, and in row spacing was 5 ft. Each variety by mulch treatment was replicated 3 times at each location. Fertility consisted of applications of 1 to 1.5 ounces of 10-10-10 per plant every 4 to 6 weeks during the active growing season (March thru August). Plants were monitored for growth for 3 years. In Fall 2000, final survival and vigor ratings were made. Survival data were simply the percent of plants remaining in each plot. Plant vigor ratings were made only for surviving plants. The rating was on a 1-to-10 scale, with a value of 1 being very poor vigor, and a value of 10 being very high vigor.

Table 1. Plant survival and vigor rating for 21 cultivars of southern highbush blueberries grown at Alapaha, GA from 1998 to 2000 with and without pine bark mulch.

	Plant Survival (%)		Plant Vigor Score (1 to 10 Scale)	
Cultivar	No mulch	Mulch	No mulch	Mulch
Biloxi	100	100	3.7	5.3
Bladen	88.9	66.7	4.3	4.7
Cooper	55.6	100	6.0	7.7
Duplin	100	50	4.0	6.0
Georgiagem	100	100	3.3	6.3
Jubilee	100	88.9	4.3	6.3
Legacy	100	77.8	3.3	5.3
Magnolia	100	100	4.7	8.0
Marimba	100	100	5.3	6.0
Misty	77.8	88.9	2.0	2.0
O'Neal	100	100	3.0	5.7
Ozarkblue	77.8	66.7	4.0	6.7
Pender	100	83.5	2.5	6.0
Reveille	77.8	100	2.7	7.0
Sampson	83.5	100	2.5	5.5
Sharpblue	77.8	100	4.3	5.7
Southmoon	44.4	55.6	2.0	3.0
Star	100	100	4.3	6.3
Summit	66.7	83.5	3.0	6.0
TH-621	100	100	6.0	9.0
TH-622	100	100	7.0	9.0
$LSD_{0.10}$	28.9	24.4	2.0	1.9

Results. Varieties responded differently depending on mulch treatment and location. In general, blueberries located at Alapaha survived better and were more vigorous (Table 1) than those at Griffin (Table 2). This is to be expected because of the more suitable soil characteristics such as pH, drainage, and soil texture at Alapaha. Upland soils, such as those in the Piedmont area (Griffin), typically are not well suited for blueberries, especially SHB. However, mulching with pine bark did improve survival and vigor, even at the upland location.

Table 2. Plant survival and vigor rating for 14 cultivars of southern highbush blueberries grown at Griffin, GA from 1998 to 2000 with and without pine bark mulch.

	Plant Survival (%)		Plant Vigor Score (1 to 10 Scale)	
Cultivar	No mulch	Mulch	No mulch	Mulch
Bladen	44.4	33.3	1.0	1.7
Cooper	77.8	66.7	2.0	2.7
Georgiagem	33.3	44.4	1.0	4.0
Jubilee	22.2	66.7	1.5	4.5
Magnolia	33.3	77.8	1.5	3.7
Marimba	55.6	88.9	1.5	2.3
Misty	11.1	11.1	1.0	1.0
O'Neal	77.8	100	2.0	4.7
Ozarkblue	44.4	77.8	2.0	4.3
Reveille	44.4	55.6	4.5	5.5
Sharpblue	33.3	77.8	2.0	3.7
Southmoon	0.0	44.4	0.0	2.7
Star	77.8	77.8	2.3	3.3
TH-622	66.7	50	3.0	6.0
$LSD_{0.10}$	49.4	43.5	1.7	2.8

With respect to survival, 'Southmoon' struggled at both locations with or without mulch. Other varieties having poor survival at Alapaha, even with mulch, included Bladen, Duplin, and Ozarkblue. Most other varieties had decent survival at Alapaha whether mulched or not. At Griffin, survival without mulch was poor for all varieties except Cooper, O'neal, Star, and the UGA selection TH-622. Survival of plants at Griffin with mulch was best for Magnolia, Marimba, and O'neal, followed by Cooper, Jubilee, Ozarkblue, Sharpblue, and Star. Survival of remaining cultivars was less than 60%.

While survival ratings are important, plants that survive should also be vigorous in order for the highest production potential. At Alapaha, plant vigor ratings with mulch were highest for the UGA selections TH-621 and TH-622, followed

by Cooper, Magnolia, and Reveille. Others having moderate vigor (score greater than 6.0) when mulched included Georgiagem, Jubilee, Ozarkblue, Pearl River, and Star. In the absence of mulch at Alapaha, only Cooper and the selections TH-621 and TH-622 had vigor scores of 6.0 or greater. The only other notable variety on bare soil was Marimba, which basically had similar vigor whether mulched or not. The varieties Misty and Southmoon had very poor vigor at Alapaha, even with mulch. At Griffin, only Reveille and TH-622 had noteworthy vigor with mulch. Reveille also had the highest vigor rating without mulch, but all other varieties had vigor scores of 3.0 or less without mulch at Griffin.

Conclusions. Overall, the findings from this research provide a relative ranking of survival and vigor of several southern highbush blueberry varieties with and without pine bark mulch. Extremely poor performers for Georgia would likely be Southmoon and Misty. The UGA selections TH-621 and TH-622 show great potential for the future. However, those currently available varieties that are best suited for growing with mulch would be Star and Reveille for early season, and Cooper and Magnolia for later season selections. The data strongly support the value of pine bark mulch in the production of southern highbush when soils are not high in organic matter. Of the currently available varieties, Marimba would be a potential variety to grow without mulch in south Georgia if the soil was not generally considered suitable for SHB. There continues to be a great need for southern highbush blueberry varieties suitable for a wide range of soil conditions in Georgia.

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Pierce's Disease, a Primary Bacterial Disease of Wine Grapes in the Southeast

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Pierce's disease (PD) is a major bacterial disease associated with wine grape production in the Southeast. The disease largely limits the production range for *Vinifera* wine grapes where it occurs. Pierce's disease was first identified in 1892 by N. B. Pierce in southern California. However, the bacterium which causes the disease, *Xylella fastidiosa*, was not cultured till 1978. The bacterium resides exclusively within the xylem tissue of the grape, hence the origin of the scientific name.

Sharpshooters and spittlebugs vector the pathogen as they feed. The bacteria form plaques on the insect mouthparts, and the bacteria can be transmitted immediately following feeding. Less than 100 bacteria per insect are required for transmission, and the adult insects are able to transmit bacteria throughout their lifespan. Immature insects loose the bacteria as they molt, and the bacteria is not transmitted to insect eggs. Of the insects which act as vectors, the glassy-winged sharpshooter, *Homalodisca coagulata*, is primary within the Southeast. Due to its robust size and strong mouthparts, this insect can obtain food from the lower portions of the canes, resulting in chronic infections within a single season. Other insects generally feed on the tender, peripheral tissues of the vine, resulting in infections which may often be removed during pruning operations.

Symptoms of PD can be confused with some nutrient deficiencies or drought stress, since the bacteria, along with plant tyloses, clog the xylem tissue. Early-season symptoms are particularly confusing, whereas late-season or fall symptoms are relatively clear. Once PD symptoms have fully manifested themselves, the following will be present:

- Leaves show a "dieback," "scalding," or "scorch" symptom (Figure 1). Necrosis (dead tissue) forms near the margins of the

leaf blades, and the necrosis extends across the leaf veins (not interveinal). On red varieties, the margin between healthy and dead tissue usually will show a reddish-purple color in a defined band. This is not clearly observed with white varieties, and a yellowish, irregular band may be observed in this case.

- Eventually, leaf blades abscise, but petioles remain attached for an extended period of time. Substantial defoliation can rapidly occur.
- The bark on the canes will lignify or mature in irregular patches, resulting in green patches or "islands of green" surrounded by brown.
- Due to the complete shutdown of the xylem, any grapes on infected canes will eventually form shriveled "raisins."

Figure 1. Leaf symptoms of Pierce's disease on a red variety. Note the reddish-purple border between dead and healthy tissue.

Control measures for PD are rather limited. Therefore, site selection is critical. For whatever reason, the consensus of evidence does indicate that PD requires warmer weather for development and spread. This may be related to the impact of cold on the bacterium, the vectors, or both. Without regard, sites which experience warm to hot temperatures for most of the year are not acceptable for wine grape production. Since increasing elevations result in cooler climates, it has been speculated that production of grapes above 1300 feet elevations would result in vineyards which are free of PD. However, we now know that this is definitely not the case. Surveys in GA over the last three years have found PD at elevations of approximately 1800 feet. However, the disease has not yet been observed at greater elevations. Nonetheless, disease severity has thus far been minimal at elevations which are greater than 1300 feet. Therefore, though the 1300 elevation rule is not hard or fast, it may be accurate enough for making decisions as to vineyard location. In the Southeast, this rule would limit wine-grape production to the foothills of the Appalachians, and this is essentially where the new production areas are located.

There are varietal differences in susceptibility to PD. For example, Chardonnay is highly susceptible to infection, whereas Zinfandel is tolerant. However, all grape varieties grown in the Southeast can develop PD, and no true resistance is observed. Without regard to disease tolerance, producers generally select varieties for potential wine quality.

Currently, management of PD is limited to vector control and roguing of infected plants. Vector control in the Southeast is limited to use of a few insecticides, principle of which is imidacloprid in Pravado® Solupak. The exact timing of applications is still in question, since limited research has been conducted. However, monitoring for the glassy-winged sharpshooter is encouraged, and once this insect appears in a vineyard, insecticide application is warranted.

Plants which show chronic (full) symptoms should be removed immediately. Removal can be conducted either through pulling the vine up or cutting the vine off at the base. If the vine is cut, the stump should be sprayed with glyphosate, and any new shoots which may arise should be likewise be immediately destroyed. Plants which show limited or doubtful symptoms should be flagged for observation in the coming year. Where infections are confirmed but limited, some success has been reported with cutting the vine back to a point just above the graft un-

ion – basically cutting out the infected tissue. However, this is very risky; since symptoms are often delayed, by the time one determines whether such actions were successful, the plant could have served as an inoculum source for infection of numerous other vines. Use of Enzyme-linked immunoadsorbant assay (ELISA) or Polymerase-Chain Reaction (PCR) tests are available for confirmation of PD. However, these tests are relatively expensive, and samples have to be sent away for testing. There is currently no in-field test for PD, so symptomatology is very important.

At this point, there is no reason to say that Pierce's disease will not be a manageable disease of grapes in the Southeast. As we learn more about vector management and other aspects of the disease, control methods will likely improve.

References. Varela, L.G., Smith, R.J., and Phillips, P.A. 2001. Pierce's Disease. University of California Agriculture and Natural Resources Publication 21600.

Pesticide News

Abound Registered for Some Small Fruits

Abound is a broad-spectrum fungicide which recently received a full registration for blueberry, currant, elderberry, gooseberry, huckleberry, lingonberry and juneberry. Primary target diseases are Mummyberry, Alternaria Fruit Rot, Phomopsis stem canker, and Anthracnose fruit rot. Abound is a reduced risk fungicide that needs to be rotated with fungicides of different modes of action. A maximum of three total sprays per acre per crop year is allowed.

Bramble Chores

Winter/Spring 2002 Work Schedule for Bramble Growers

Gina Fernandez
North Carolina State University

Please review the fall/winter bramble chores to make sure that you have completed all tasks for winter. Here is a brief summary of chores for the next few months to prepare your brambles for the upcoming growing season. If you have any questions give me a call (252-793-4428 x167).

Agricultural Chemical recommendations for North and South Carolina can be found at the addresses listed below.

North Carolina:
http://ipm.ncsu.edu/agchem/agchem.html
South Carolina:
http://cufan.clemson.edu/pestmgmtguide/

Pruning.
Fall Bearing Raspberries. Fall bearing (actually mid to late summer for most of NC) raspberries fruit at the top of the current season's canes ("primocanes"). The simplest way to manage these varieties is to mow them off at ground level during the dormant season. Be sure to mow them off close to the ground so that new shoots come from the roots and not from lateral buds on cane stumps.
Pruning Blackberries and Summer Fruiting Raspberries. These types of brambles bear fruit on second year canes. During the winter prune out the spent floricanes from the previous season. The remaining primocanes are thinned 3-4 / ft2.

Herbicides. Apply preemergent herbicide in spring if not applied in fall. There are several chemicals that are labeled for use in NC depending on age of plating and time of application, see your states agricultural chemical recommendations.
-Apply post emergent herbicides as needed. Be sure that the chemical you are using is labeled

for bearing plants, many herbicides cannot be used beyond the first year.
- Herb Stiles and I have posted an article on the web on the effect of glyphosate use on bramble growth. If you see new stunted growth you may have glyphosphate injury. This can be mistaken for double blossom injury. See the images at the web site below.
http://www.smallfruits.org/Recent/AvoidGlyphosate.htm

Insect and Disease control.
Preebloom: -Apply liquid lime sulphur or Bordeaux for control of anthracnose in late winter or early spring before new buds are less than 1/2" long
-Crown borers can be a problem in the early spring, as well as aphids, thrips, Japanese beetle, fruitworm, rose chafer, stink bugs and psyllids. Catch these early w/ a prebloom spray, see your states agricultural chemical manual.

Bloom: -Double blossom (AKA rosette). Primocanes are infected in the spring or early summer, but disease symptoms are not evident until the following year when new growth begins on the fruiting canes. The best thing to do is to remove the infected floricanes to disrupt the cycle. With the loss of Benlate, chemical control of double blossom with that compound is no longer possible.
-Botrytis: Apply fungicides at early bloom and repeat at full bloom.

EPA has approved use of Savey 50DF for control of mites on caneberries, including black and red raspberries and blackberries (See Small Fruit News Vol. 1 Issue 1). The preharvest restrictions are 3 days for caneberries (blackberries and raspberries). Please note that it is only effective on eggs. If you need a copy of the supplemental label, contact your Gowan distributor.
Irrigation. -Plan for the irrigation season. Bramble plants need about 1"-2" water/week.

Trellises. -If you are interested in trying something new, look at the shift trellises designed by Herb Stiles at Virginia Tech University. I believe these trellises can do for brambles what plasticulture has done for strawberries in the SEUS. Detailed instructions are available at:
http://www.vaes.vt.edu/research/publications/abstract.html#952
-Make any last minute repairs to existing trellises before canes start growing

Fertilizer. Place nitrogenous fertilizers in row before new canes emerge in spring. Raspberries: Apply 500-800 lbs of 10-10-10 per acre in split applications. Apply half in Feb-March and the remainder in April-May. Spread uniformly across the row or side dress with half on each side of row in a 3 foot wide band.
Blackberries: In established plantings apply 60 to 80 lb/acre N. Nitrogen can be applied in split or single applications. If using a split application, apply the first portion at bud break and the remainder just after harvest. Ammonium nitrate is the most common form of N used on blackberries. The incorporation of P and K should be based on soil test recommendations.

From the Plant Problem Clinics…

M. Williamson (CU), T. Creswell (NCSU) and J. Fowler (UGA)

Small fruit samples received between September and December 2001 from the clinics in South Carolina (SC), North Carolina (NC) and Georgia (GA)

			NUMBER OF OCCURENCES		
HOST	**DIAGNOSIS**	**CAUSAL ORGANISM**	**SC**	**NC**	**GA**
Blackberry	Leaf spot	*Cercospora* sp.			
	Fungal canker	undetermined		1	1
	Virus	undetermined			
Blueberry	Anthracnose	*Gloeosporium* sp.	3		3
	Leaf spot	*Septoria* sp.	1		3
		Cercospora sp.	1		1
		Pestalotia sp.	2		1
		Phomopsis sp.	2		1
		Diplodina sp.	1		1
		Mycosphaerella sp.	1		
		Giberella sp.	1		
	Root rot	*Pythium* sp.	3		
		Rhizoctonia sp.	1		
		Pythium/Rhizoctonia sp.	1		3
		Phytophthora cinnamomi		2	2
Grape	Bitter rot	*Greeneria uvicola*			2
	Crown gall suspected			1	2
	Powdery mildew	*Uncinula necator*		1	
Muscadine	Anthracnose	*Gloeosporium* sp.	1		
	Bitter rot	*Melanconium fuligineum*	1		
	Bitter rot	*Greeneria uvicola*			
	Fruit rot	*Phoma* sp.	1		
	Gray mold	*Botrytis* sp.	1		1
	Leaf spot	*Phyllosticta* sp.	1		
	Leaf spot	*Septoria* sp.	1		
	Oedema		1		
Kiwi	Leaf spot	*Phyllosticta* sp.			1
Pomegranate	Fruit rot-internal	*Aspergillus* sp.	1		
	Fruit rot	undetermined		1	
Strawberry	Anthracnose suspected			1	
	Anthracnose	*Colletotrichum acutatum*		12	
	Anthracnose	*C. fragariae*		1	
	Anthracnose	*C. gloeosporioides*		3	
	Black root rot	*Rhizoctonia* sp.			
	Black root rot complex			2	2
	Crown rot	*Phytophthora cactorum*		3	
	Leaf spot/blight	*Phomopsis* sp.	1	1	
	Leaf blotch	*Gnomonia* sp.			
	Petiole blight	*Alternaria* sp.	1		
	Petiole blight	*Fusarium* sp.	1		
	Powdery mildew	*Oidium* sp.	1		
	Powdery mildew	*Sphaerotheca macularis*		6	
	Root and crown rot	*Fusarium sp.*		1	
	Root rot	*Pythium/Rhizoctonia* sp.	2		2
		Pythium sp.	1		
	Root and stem rot	*Rhizoctonia* sp.		4	
	Verticillium wilt	*Verticillium* sp.		3	

Focus

Small Fruit News Favorites

Compiled by Guido Schnabel
Clemson University

Patrolling for weeds, first of a four part series to identify and control weeds (American Fruit Grower, January 2002).

Nozzle size, rig speed and weather conditions are factors influencing spray drift, reports Gary Burchfield (The Grower, January 2000).

Raspberry varieties researched for year-round production, a report from Adam Dale, University of Guelph (The Fruit Grower News, January 2002).

Growers control destiny with their own winery, reports Melissa Hansen (Good Fruit Grower December 2001).

Prevention is the best control for grape viruses, reports Jeri Freimuth (Good Fruit Grower, November 2001).

You may request a copy of one (or more) of the above articles sent to you free of charge by fax (call 864 656 6705) or by sending a stamped and self-addressed envelope to Guido Schnabel, Clemson University, Department of Plant Pathology & Physiology, 218 Long Hall, Clemson, SC 29634-0377. Don't forget to indicate which article you would like.

Meetings and Agent Training

Bramble Production Extension Agent Training Short Course. Sheraton Imperial Hotel, Raleigh, NC, February 5-6, 2002. Sponsored by the Southern Region Small Fruit Consortium and held in conjunction with the NABGA annual meeting. For further information contact Gina Fernandez (gina_fernandez@ncsu.edu) or Jim Ballington (jim_ballington@ncsu.edu)

Southeast Strawberry Expo/North American Berry Conference. Hosted by the North Carolina Strawberry Association and joining forces with the North American Strawberry Growers Association, the North American Bramble Growers Association and The International Ribes Association, Feb. 2-6 in Durham, NC (Contact information: Debby Wechsler, call 919 542-3687, ncstrawberry@mindspring.com)

2002 Georgia-South Carolina Wine Grape Meeting. Sat., Jan. 12, 2002, Savannah Civic Center (Registration information: call 1-877-99GFVGA)

2002 Georgia Blueberry Meeting. Fri. and Sat., Jan. 11-12, 2002, Savannah Civic Center (Registration information: call 1-877-99GFVGA)

2002 Georgia-South Carolina Strawberry Meeting. Sat., Jan. 12, 2002, Savannah Civic Center (Registration information: call 1-877-99GFVGA)

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Editor and Contributor..... Guido Schnabel

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