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Inside this issue:

The Rain Kings

We've all heard that childhood rhyme, "rain, rain go away, come again some other day". Well, someone outside of Mississippi must have been singing that tune often and sent it our way. The blueberry season was set up to be a winner, even with the damage from the mid-March freeze event. Georgia was hurt badly and so was North Carolina. Prices were high and, oh so tempting. And then….and then….the rain started. Even as I write this on July 24 the rain hasn't really stopped. Our rain gauges in Poplarville measured 21 inches of rain during June. That is about 4 times the normal average for the month. This year was also a low-chill year, so I've seen and heard affects of that on southern highbush and rabbiteye alike. We can't seem to catch a break, but there is no other choice but to push ahead. In this issue I discuss something that deserves some serious thought — should we do more with southern highbush blueberries and start to reduce our dependency on rabbiteye cultivars? Also, info on SWD, nematodes, and more.

Ring Nematode Control Study on 'Farthing'

Dr. Phil Brannen and colleagues at UGA performed this study using Majestine.

"Blueberry seedlings were transplanted into 8" pots containing field soil infested with ring nematodes and treated at plant with drench applications of 1%, 2%, 2% + 1% applied 30 days later, and a water control, with 7 replications of each treatment. Population densities of ring nematodes were assayed before treatment, 30 days after treatment, and 90 days after treatment, when plant volumes were also determined. No significant differences ($P<0.05$) were observed among treatments for any of the variables measured. There was a trend toward lower numbers of ring nematodes in the 2% + 1% rate, but this trend must be viewed with consideration of a similar trend downward in the plant growth measurement. Since plant-parasitic nematodes are obligate biotrophs (can only feed on living root cells of the host plant), negative impacts on plant growth usually result in fewer nematodes. Nematode population densities were lower across all treatments at 90 days, as the plants became root-bound in the 8" pots. It is possible that greenhouse trials do not reflect potential product activity in field trials, and these are results from only one greenhouse trial. "

Is it Time to Switch to Southern Highbush?

Eric Stafne
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Recently I read an article by Dr. John R. Clark, noted plant breeder, online at www.growingproduce.com/fruits/berries. In this article he gives a personalized account of his visiting with Dr. Paul Lyrene (University of Florida) and Dr. Arlen Draper and seeing southern highbush blueberries (SHB) in Florida. Clark makes the following observations:

"...the world of blueberries has changed. Much of this change is due to the tremendous innovation of incorporating low-chill requirements in highbush-type blueberries, or as they are known now, Southern highbush blueberries. The expansion of blueberry production due to this innovation is remarkable.

Not only did this advancement create the Florida blueberry industry, it has become the foundation of California production, as well as becoming important in Georgia and other states. But, the impact goes well beyond the U.S. borders, and has allowed production in many countries including Spain, Morocco, Peru, Chile, Argentina, Australia, South Africa, and now Mexico."

As evidenced by the words above, this innovation not only transformed the blueberry industry in the South, but around the world. While that is a good thing for farmers in general, it makes the marketplace more crowded. With a warming climate (i.e. lower chill) in the South, does moving toward SHB at the expense of rabbiteye varieties make economic sense?

Georgia, Florida, and North Carolina have planted many acres of SHB. They are reaping the benefits of an earlier market and a more in-demand product. Of course the downsides to growing SHB are many: they are more difficult to grow, they bloom earlier and are thus may require more frost protection, they may have greater susceptibility to certain diseases, etc. So, is it a wash? One might consider another factor — spotted wing drosophila (SWD). The populations of this pest increase dramatically during June, the heart of rabbiteye harvest. But, SHB berries are much earlier, when SWD populations are lower, thus escaping much of the potential damage. Now, we should not consider this a static situation. If more SHB were planted there could be a concomitant increase in SWD earlier in the season, but for now the populations are limited at that time of the season.

In Mississippi we are one of the states that has benefited from the creation of SHB. As Dr. Clark goes on to say:

"...the diversity of blueberry production in environments where there "once was none" that has developed from the reduced-chill breeding effort is one of our most exceptional berry breeding stories of the modern day."

Should we be taking more advantage of this exceptional berry breeding story?

Fee Changes at MSU Plant Diagnostic Lab

Effective August 15, 2017, the plant diagnostic lab at Mississippi State University will be changing the fees that we charge for samples. The new fees are listed below. The lab is now expected to be 100% self-supporting and we are making every effort to keep our services available to you during this fiscally challenging period. Keeping fees manageable for our clients is important to us and we work hard to subsidize costs by acquiring external funding. This revised fee schedule more realistically contributes to the actual cost of providing services. There is still no fee for samples that are only submitted as digital images. You can find our sample submission forms and lots of other information about our services at http://extension.msstate.edu/lab

Plant Pathology per sample Testing Fees

EFFECTIVE AUGUST 15, 2017

	Sample from MS	Sample from outside MS
Golf Course Turf	$25	$35
General Plant Disease	$10	$20
Fescue Endophyte	$25	$25
MSU Research	$6	

Nematode per sample Testing Fees

	Sample from MS	Sample from outside MS
General Nematode Analysis	$11	$20
MSU Research	$5	

Spotted Wing Drosophila Flies Killed by a Fungal Disease in Mississippi

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To berry producers, no pest is as destructive as the spotted wing drosophila (SWD), *Drosophila suzukii,* a recent fly invader from Asia, which has spread globally in less than a decade. Unlike native *Drosophila*, SWD has a special egg-laying structure that works like a double-bladed saw; it cuts holes into which a female can insert eggs into the fruit's flesh. Eggs hatch in three days or fewer, and larvae move deeper into fruit, feeding on fruit pulp and yeasts introduced with the eggs. SWD flies are difficult to control with insecticides because adults quickly reinvade fields after sprays have dissipated and larvae remain safe inside berries. SWD flies have no known effective natural enemies in North America, and, until now, disease within wild SWD populations was unknown.

In a small (0.87 acre) orchard owned by Tom Mann of Clinton, Mississippi, and during an unusually cool and wet June in 2017, hope for controlling adult SWD arrived as a fuzzy golden brown to whitish fungus of the genus *Entomophthora.* The Greek word "*Entomophthora*" literally means "Insect Destroyer". This orchard has had SWD infestations dating back to 2012, but not until 2017 were diseased, immobilized SWD adults first observed. This species of fungus is yet to be identified, but microscopic examination indicates that this microbe is or is closely related to *Entomophthora muscae,* a highly virulent disease of house flies, root maggot adults (*Delia* spp., Gryganskyi et al. 2013), and a moderately lethal pathogen to other *Drosophila* species (Goldstein 1927, Steinkraus and Kramer 1987, Kalsbeek et al. 2001). Insect-killing fungi are useful agents of natural biological control because they effectively transform their hosts into fruiting bodies to improve disease spread. Once fungal spores attach to an adult host, they produce infection pegs that penetrate the insect body, allowing the fungus to multiply inside the host before it emerges from the cadaver and disperses more spores. *Entomophthora* fungi, like *E. muscae,* also alter host behavior by inducing flies to climb to high, shaded spots that are relatively cool and moist (Hajek and Leger 1994). There, flies become immobile and the fungus usually anchors them to fruits or leaves such as on fig trees **(Figures 1 and 2).**

SWD cont.

The fungus ultimately kills the host through exhaustion or with toxins. It then consumes host organs and bursts out between segments of the host body (Goldstein 1927, Steinkraus and Kramer 1987). The fungus then turns to its own reproductive needs, producing masses of whitish infectious spores that appear as fuzzy outgrowths of the host's body **(Figure 3)**. The spores are forcibly discharged (Humber 2016) and air currents then disperse the UV-sensitive spores, usually at night, to new hosts within the safety of the plant canopy (Carruthers and Haynes 1986). Much like male house flies, healthy male SWD copulate with immobilized and presumably infected females, and in doing so, become infected themselves **(Figure 4)**. Fungal transmission during copula is a common path that insect pathogens take to proliferate more quickly through host populations (Kalsbeek et al. 2001). About half of infected house flies cure themselves by undergoing a "behavioral fever", during which they move to a place at which temperatures exceed the thermal limit of the fungus (~35°C or ~95°F), above which the fungus dies (Kalsbeek et al. 2001). This cure would unlikely save SWD flies because *E. muscae* and *D. suzukii* die at about the same high temperatures (Enriquez and Colinet 2017).

This fungal disease that kills SWD may be difficult to exploit. However, the unusually cool and rainy conditions in June 2017 in Mississippi probably allowed this fungal outbreak to take place and if these weather patterns persist then the incidence of *Entomophthora* disease among SWD flies may increase over time. Currently, we are investigating the culturing of this fungus. Of the 700 species of identified insect fungal pathogens, only about 10 species have been used for biological control or are undergoing testing. *Entomophthora* fungi are host-specific pathogens that are not easily cultured outside of a host body on artificial media, and the spores **(Figure 5)** are short-lived (Hajek and Leger, 1994). Using protein-rich rearing media has proven successful in the short-term (Srinivasan et al. 1964). However, preserving viable cultures of *Entomophthora* for SWD control may require artificially rearing highly susceptible and common hosts such as house flies and re-infecting each new generation with diseased cadavers (Steinkraus and Kramer 1987). Enough of these diseased fly cadavers could then be placed in a baited trap and serve as auto-dispensers of infectious spores that may subsequently infect SWD flies in a berry field.

References

Carruthers, R.I. and Haynes, D.L., 1986. Environmental Entomology, 15(6): 1154-1160.
Enriquez, T. and Colinet, H., 2017. PeerJ, 5, p.e3112.
Goldstein, B., 1927. Mycologia, 19(3): 97-109.
Gryganskyi, A.P., Humber, R.A., Stajich, J.E., Mullens, B., Anishchenko, I.M., and Vilgalys, R., 2013. PLoS ONE 8(8): e71168. Doi:10:1371/journal.pone.0071168.
Hajek, A.E. and Leger, R.J., 1994. Annual Review of Entomology, 39(1): 293-322.
Humber RA. 2016. 127-145, in Li D-W (ed.), Biology of Microfungi. Cham, Springer.
Kalsbeek, V., Mullens, B.A. and Jespersen, J.B., 2001. Biological Control, 21(3): 264-273.
Srinivasan, M.C., Narasimhan, M.J. and Thirumalachar, M.J., 1964. Mycologia, 56(5): 683-691.
Steinkraus, D.C. and Kramer, J.P., 1987. Mycopathologia, 100(1): 55-63.

Figure 1. Immobilized

Photo: Tom Mann

Figure 2. Immobilized and diseased SWD under

Photo: Tom Mann

Figure 3. A diseased SWD female, fungus bursting from host

Photo: Melinda Butler

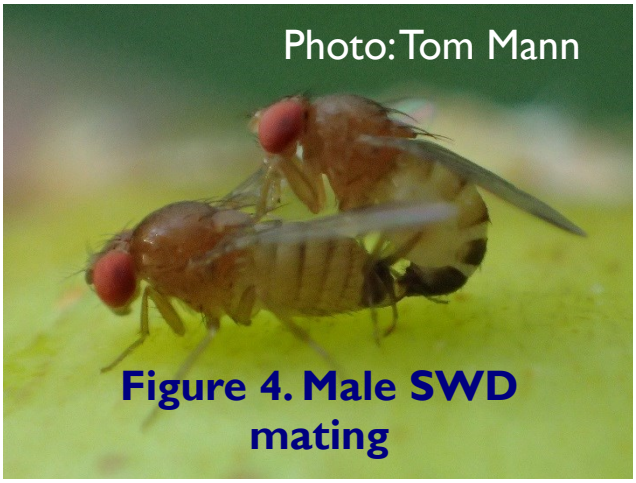

Photo: Tom Mann

Figure 4. Male SWD mating

Figure 5. Infectious spores

Photo: De-Wei

Blueberry Jubilee 2017 in Poplarville

Eric T. Stafne, MSU-ES

I was in charge of getting vendors for the 2017 Poplarville Blueberry Jubilee. This year we had about 20 vendors selling blueberry products and other related things. Of course this year there was a shortage of fresh blueberries due to the ample rainfall. Amazingly it did not rain at the Jubilee for the first time in a couple years. Below is a photo of the event by the courthouse in downtown Poplarville, MS. Crowds were excellent this year and everyone seemed to enjoy themselves immensely. If you have never been out to the Blueberry Jubilee I encourage you to attend and see for yourself — there is a 5K run, all kinds of food and craft vendors, live music, and much more. Come support the community and the blueberry industry of Mississippi.

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Updated Must Have Resources

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There are just some resources that a grower (and an Extension Specialist) can't do without. Luckily, we have such great publications to draw from in the Southeast region. Below are three updated publications for 2017, plus a link that is the source of them. These guides are for Organic blueberry production, use of growth regulators, and IPM. Extremely valuable information for any blueberry grower.

2017 Southeast Regional Organic Blueberry Pest Management Guide A Guide for Managing Diseases, Insects, Weeds and Wildlife in Blueberries in the Southeast

Southeast Regional Blueberry Horticulture and Growth Regulator Guide

2017 Southeast Regional Blueberry Integrated Management Guide

Small Fruit Consortium:

http://www.smallfruits.org/SmallFruitsRegGuide/index.htm

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