Southeastern Regional Peach Newsletter

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Editors Note

Happy holidays to all! Robert Lynd, an essayist, wrote that "there are some people who want to throw their arms round you simply because it is Christmas; there are other people who want to strangle you simply because it is Christmas." Without regard to how the holidays make you feel, it is a good time for reflection, and I hope that each of you will take advantage of this opportunity.

The past year has revealed new challenges for the year to come. Unfortunately, we now have good evidence that the brown rot organism is developing propiconazole (DMI) resistance, and this may be a real threat to peach production, particularly in Georgia. Guido Schnabel (Clemson University) and I will make comment on this in an enclosed article. This will be a major topic of discussion at upcoming production meetings, so stay tuned.

Also included in this edition, Andy Nyczepir (USDA-ARS) provides an update on an alternative nematode management practice, Bob Bellinger (Clemson University) discusses new drift reduction requirements, and Wayne Mitchem (North Carolina State University) faithfully provides his update on current weed control issues.

There are certainly many challenges which lay ahead for southeastern peach production. With the collective efforts of the peach producers, researchers, extension personnel, and industry, I am convinced that we can meet the challenges in 2004 and beyond. Godspeed to each of you as we enter a new year.

Phillip M. Brannen
Editor

Focal Points – New Information for the Peach Industry

❈ **FDA's New Food Bioterrorism Regulation: Registration of Food Facilities.**
Bill Hurst (UGA Food Science Extension Outreach Program; (706) 542-0993; bhurst@UGA.EDU) recently announced the following. "In an effort to further protect the public from the risk of attack on the food supply, the FDA has implemented a food facility registration program. **Any commercial facility that manufactures, processes, packs or holds food for human consumption MUST register by December 12, 2003.**

There is no fee. Since FDA expects over 400,000 facilities to be registered by December 12, don't wait until the last minute - you might not be able to get online! If you have any doubts whether to register or not, either call the FDA at 1-800-216-7331, email them at furls@fda.gov, or go ahead and register before the deadline.

There are several ways to register: complete the seven-page Form 3537 (download at http://www.cfsan.fda.gov/~furls/frm3537.pdf - requires Adobe Reader program on your computer to open) and mail or fax it in, or register online at http://www.cfsan.fda.gov/~furls/ovffreg.html.

See step-by-step instructions for filling out the online form below." Bill suggests that you "print out the paper form 3547 (7 pp) at the link above and fill it out before going online, because the registration

system will automatically time out if there is no activity for 30 minutes (if you have to look something up), and you will have to start over again!"

❈ **EPA announces fenhexamid tolerance for post-harvest disease control in stone fruit.** A post-harvest use tolerance was recently granted by EPA for fenhexamid, the active fungicidal ingredient in Elevate™ and one component of CaptEvate™ (Arvesta Corporation). Granting of a tolerance is just one step in the path to product development. If a commercial product comes to market for stone fruits, it is likely to be a combination product (i.e. fenhexamid plus another fungicidal component), since fenhexamid does not have good activity against Rhizopus rot. Any additional options are welcome in the post harvest arena, since Scholar™ (Syngenta Crop Protection) is the only current, full-spectrum option.

Weed Science Updates

Controlling Winter Annual Broadleaf Weeds
(It's important! If you don't believe me, ask an entomologist.)

Wayne Mitchem,
North Carolina State University

Orchard floor management impacts total orchard management in a number of ways. An excellent example is the significance of winter annual broadleaf weed control. A great deal of research has been done over the years to illustrate the significance of winter annual broadleaf weed control on cat-facing insect populations. It has been proven that eliminating winter annual weeds reduces cat-facing insect populations, and this practice is part of an integrated approach to managing cat-facing insects. Herbicide application 4 to 6 weeks prior to bloom can effectively control winter annual broadleaf weeds and reduce insect pressure.

There are several approaches to managing winter annual weeds on the orchard floor. Which route a grower takes depends on orchard floor vegetation in the drive alleys between tree rows. That area may have a perennial grass or small grain cover crop that is actively growing (not dormant). Another possibility is the area has an established warm season perennial grass that is dormant or native vegetation is allowed to grow in the area and managed with mowing or herbicides. Depending on the situation, the herbicide options vary, so let us approach each situation independently.

Non-dormant, established ground cover situation.
Due to the fact that desirable vegetation is established in the drive alley, non-selective herbicides like glyphosate and paraquat are not an option. In these situations, a dense ground

cover has probably reduced broadleaf weed populations (due to competitiveness between species). Therefore, populations of broadleaf weeds are typically less than in the alternative situation. In these situations, growers can use 2,4-D. It is inexpensive and effective on a number of winter annual weeds including bittercress, Carolina geranium, cutleaf eveningprimrose, pepperweed, vetch, wild lettuce, wild radish, as well as fall emerging perennials like dandelion and plantain. However 2,4-D can be weak on horseweed, dock, and chickweed. Stinger is now registered for use in peach orchards. Stinger controls some weed species more effectively than 2,4-D. Those species include all clover and vetch, dock, horseweed, and perennial sowthistle. Grass species established in the drive alleys are not adversely affected by either of these herbicides.

Dormant ground covers or native vegetation.
In situations were the ground cover is dormant or the middles grow up in native vegetation, non-selective herbicides may be used in the winter. Paraquat will provide a quick burn down; however, a number of winter annual species tend to re-grow after application. Glyphosate provides better results than paraquat. One weed that glyphosate does not control is cutleaf eveningprimrose. Orchards infested with cutleaf eveningprimrose can be treated with glyphosate plus 2,4-D, which is very effective. Remember to follow all requirements for glyphosate use in peach, which are listed on the product label.

In the event you need assistance with weed identification you can contact your county agent (Cooperative Extension Service), or there are several web sites that have a number of weed species listed to assist with identification. The Virginia Tech web site is very good (http://www.ppws.vt.edu/weedindex.htm).

Pesticides Update

New Drift Reduction Requirements Hit the Label

Robert G. Bellinger
Clemson University

What is drift?

There have been a number of working definitions for pesticide drift used in the past, but in it's Pesticide Registration Notice (PR NOTICE 2001-X; 12/19/01) to pesticide manufacturers, the EPA set out a new definition. In that PR Notice, the EPA defined spray or dust drift as:

"the physical movement of pesticide droplets or particles through the air at the time of pesticide application or soon thereafter from the target site to any non- or off-

target site. Spray drift shall not include movement of pesticides to non- or off-target sites caused by erosion, migration, volatility, or windblown soil particles that occurs after application or application of fumigants unless specifically addressed on the product label with respect to drift control requirements."

This definition is based on a definition of spray drift which was composed by participants of the National Coalition on Drift Minimization, which include representatives from federal (including EPA and the U. S. Department of Agriculture) and state agencies and tribes, pesticide and equipment manufacturers, university scientists, and others, whose concern is to further pesticide applicator education, application research, and regulatory initiatives to foster reductions in spray drift.

The EPA acknowledges that pesticide vapor and the off-target movement of pesticides occurs by other means which are not included in this definition, but these can nevertheless present substantial risks to humans and the environment. The EPA more generally addresses these routes of exposure and associated risk at the individual pesticide level through its regulatory programs.

The new drift reduction label language

EPA began using new drift reduction requirements on the new Guthion® Solupak 50% label (8/31/03). The same or similar drift reduction statements will appear on new labels of other pesticides. However, because of it's high mammalian toxicity and subsequent worker exposure issue, Guthion® very likely has more rigorous drift prevention requirements than will be seen on some other labels.

Drift reduction language on the Guthion® Solupak 50% label reads as follows:

"Do not apply under conditions where possible drift to unprotected persons or to food, forage, or other plantings that might be damaged or the crops thereof rendered unfit for sale, use or consumption can occur.

1. Use the largest droplet size consistent with acceptable efficacy. Formation of very small droplets may be minimized by appropriate nozzle selection, by orienting nozzles away from the air stream as much as possible and by avoiding excessive spray boom pressure. For groundboom and aerial applications, use medium or coarser spray nozzles according to ASAE 572 definition for standard nozzles or a volume mean diameter (VIVID) of 300 microns or greater for spinning atomizer nozzles.

2. Make aerial or ground applications when the wind velocity favors on-target product deposition. Apply only when the wind speed is less than 10 mph. For all non-aerial applications, wind speed must be measured adjacent to the application site on the upwind side, immediately prior to application.

3. Do not make aerial or ground applications into areas of temperature inversions. Inversions are characterized by stable air and increasing temperatures with increasing distance above the ground. Mist or fog may indicate the presence of an inversion in humid areas. Where permissible by local regulations, the applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.

4. Low humidity and high temperatures increase the evaporation rate of spray droplets and therefore the likelihood of increased spray drift. Avoid spraying during conditions of low humidity and/or high temperatures.

5. All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers.

6. For ground boom applications, apply with nozzle height no more than 4 feet above the ground or crop canopy.

7. For airblast applications, turn off outward pointing nozzles at row ends and when spraying the outer two rows. To minimize spray loss over the top in orchard applications, spray must be directed into the canopy.

8. For ground-boom, chemigation, orchard or other airblast applications, do not apply within 25 feet of permanent water bodies (rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries, or commercial fish ponds).

9. For aerial application to potatoes, do not apply within 150 feet of permanent water bodies (aquatic buffer zone).

10. For aerial application to crops other than potatoes, do not apply within 50 feet of permanent water bodies (aquatic buffer zone).

11. For aerial applications, release spray at the lowest height consistent with efficacy and flight safety. If the application includes an aquatic buffer zone, do not release spray at a height greater than 10 feet above the ground or crop canopy.

12. For aerial applications, the spray boom should be mounted on the aircraft so as to minimize drift caused by wing tip vortices. The minimum practical boom length should be used and must not exceed 75% of the wingspan or 90% of rotor blade diameter. Use upwind swath displacement."

Plant Pathology Updates

Monilinia fructicola (Brown Rot) Resistance to Propiconazole in Georgia – Evidence and Implications for Disease Management

Phillip M. Brannen
University of Georgia

Guido Schnabel
Clemson University

Brown rot resistance conjures up diverse images among peach producers, among which are catastrophic loss of control and market failure. Thankfully, propiconazole (Orbit™, Propimax™, and other generics) resistance will likely not take this path; however, if not addressed through careful management, propiconazole resistance may be likened to a slow, torturous death – not unlike cancer. Somewhat like the early prognosis of cancer, we do not know whether propiconazole resistance is in the early or advanced stages, but we are hopeful that we have diagnosed it early – delaying death until a better treatment comes along.

So how have we come to this point, and why do we think we are observing propiconazole resistance at this time? Over the last three years, Clemson University has been collecting *Monilinia fructicola* samples from South Carolina and Georgia in an effort to determine whether propiconazole resistance has developed in the field. With a very limited number of isolates collected and processed, no resistant isolates have been collected from South Carolina; resistant isolates were obtained in both years of collection from Georgia (see Table 1). Without going over the protocols in detail, which would be more appropriate for a scientific journal, let us emphasize that this is very detailed work, and the low number of isolates does not cause concern. The fact that two out of five isolate groups from Georgia were resistant is of concern; the DF and AP isolates, both from middle Georgia, required substantially higher levels of propiconazole to prevent fungal growth in the laboratory.

Higher EC_{50} values alone would not necessarily indicate a problem in the field. In other words, though higher levels of propiconazole may be required in the lab to control the brown rot fungus, the levels of propiconazole observed in field applications may have been sufficient – still providing excellent control. To address this question, resistant isolates (AP5 and AP6) were compared with non-resistant isolates (DL71 and DL72) as to their abilities to infect peaches which were sprayed with propiconazole (half and full labeled rates; both before or after inoculation with the fungal spores). After storage for five days, the AP isolates had substantially more diseased fruit than the DL isolates (see Table 2). Therefore, it is likely that the isolates which show laboratory resistance will in fact promote greater brown rot incidence in the field.

Several questions come to mind.

(1) **Why is Georgia observing resistance ahead of South Carolina?** In general, the number of propiconazole applications in an orchard determines the sensitivity level of the pathogen population. This means that the more often you spray propiconazole or related products (Indar™,

Elite™, Nova™), the less effective they become. It is possible that propiconazole has been applied more often over the years in Georgia than in South Carolina. However, South Carolina and other states are likely not far behind. In other words, **this should be considered as a regional issue, and it should be addressed in a regional manner.**

(2) **Is this a general resistance to all DMI fungicides (to include Indar, Elite, and Nova), or is it limited to propiconazole (Orbit and similar generics)?** This is a good question. Generally, there is cross resistance between DMI fungicides; if there is resistance to one DMI, then there is also resistance to the other DMI materials. However, pathogen populations which are less sensitive to one DMI may still be effectively controlled with another DMI – simply because the efficacy of the latter DMI is higher. We need more information about the cross resistance in *M. fructicola* to make definite conclusions.

(3) **Will propiconazole products still give good control in the field?** For now, we think the answer is generally "yes." However, the product may not be as efficacious in resistance hotspots (i.e. middle Georgia). Growers may want to consider tank-mixing a DMI fungicide with Topsin-M, a benzimidazole fungicide. This mixture would more than likely control pathogen populations with reduced sensitivity to DMI fungicides and benzimidazoles. Including at least one non-DMI material during preharvest sprays (alternation) may also be important. **Bottom line -- in areas with documented reduced sensitivity to propiconazole, do not depend on propiconazole and other DMI products alone for your late-season, preharvest brown rot applications.**

(4) What are the options? The good news is that we do have rotation partners, such as Abound™ and Pristine™, that control brown rot as effectively as DMI fungicides. The bad news is that these newer products contain strobilurin fungicides which are susceptible to overnight resistance development. Pristine is newly registered, and it combines a strobilurin (pyraclostrobin) and an anilide (boscalid) for greater activity and resistance management. Abound contains azoxystrobin alone. At this point, we strongly recommend rotation of DMI materials (with or without benzimidazole tank-mixes) and strobilurin-containing products (Abound or Pristine) in preharvest sprays. In Georgia, the combination of Elevate plus Captan has provided good brown rot control in research trials, so this may be a viable, though expensive, option if all else fails (neither Elevate nor Captan alone are recommended; the combination of these two products is required for adequate efficacy). **One more note – whether tank-mixing DMI materials or using them alone, make sure to use the full labeled rate. Also, when tank-mixing materials, unless sound research has proven otherwise, do not use less than the labeled rates of any materials utilized in the combination. Reduced rates may not provide adequate control, and such practices may actually encourage resistance development, especially when using contact and systemic materials in the tank mix.**

(5) **What else can I do?** Reduce inoculum throughout the season; this includes blossom blight and green fruit rot. Use the recommended blossom blight materials, and do not use DMIs or strobilurins for blossom blight control (see the Southeastern Peach, Nectarine and Plum Pest Management and Culture Guide). At this point, we would consider saving the strobilurin products for use in the preharvest sprays, as opposed to use for green fruit rot and scab; we still have other excellent early-season scab materials, and sulfur or Captan are sufficient for scab throughout the cover sprays. Use Captan when conditions warrant for green fruit rot control. Also, use of a post-harvest material, of which Scholar™ is the only labeled product at this time, will become more important to us, even in dryer years.

The bottom line is that we have to take a very proactive resistance management approach for brown rot control. If we do not, we stand a good chance of having no effective products on the market

within the next five years. Resistance management will have to include both the DMIs and the strobilurins. Relative to brown rot control, the cost of production may increase moderately, but the cost of inaction could be much worse.

Table 1. Characteristics of *M. fructicola* isolates from South Carolina and Georgia and their sensitivity to propiconazole

Origin of isolates[x]			Year of	Isolate	EC_{50} values (ug/ml)	
Orchard	County	State	isolation	(no.)	Range	Mean[z]
DL	Anderson	SC	2001	33	0.012-0.054	0.025 a
CC02	Saluda	SC	2001	13	0.002-0.034	0.014 a
EZ	Anderson	SC	2001	9	0.003-0.014	0.01 a
SY	Edgefield	SC	2001	15	0.003-0.027	0.013 a
DF	Crawford	GA	2002	12	0.012-0.913	0.216 b
LO	Peach	GA	2002	11	0.019-0.217	0.081 a
JO	Hall	GA	2002	12	0.011-0.035	0.027 a
CC03	Saluda	SC	2003	21	0.001-0.074	0.036 a
AP	Macon	GA	2003	8	0.007-0.435	0.224 b
DL03	?	GA	2003	18	0.003-0.95	0.021 a
MC	York	SC	2003	14	0.015-0.175	0.047 a
BS	York	SC	2003	31	0.005-0.049	0.022 a

[x]isolates were obtained from established peach orchards (at least 7 years old) that either had not been exposed to DMI fungicides (DL isolates) or had been subjected regularly to two to five DMI fungicide applications for at least three years (CC02, EZ, SY, DF, LO, JO, CC03, AP, DL03, MC and BS isolates). Isolates from orchards with DMI history were collected from areas with brown rot incidence despite DMI fungicide treatments in the collection year.

[y]Kruskal-Wallis one way analysis of variance on ranks; all pairwise multiple comparison with Dunn's method ($P < 0.05$)

[z]One way Anova; FLSD ($P < 0.05$)

Table 2. Effect of propiconazole treatments on brown rot disease incidence on peach fruit.

		Disease incidence (%)[x]					
		Propiconazole (liters/ha), protective treatment			Propiconazole (liters/ha), curative treatment		
Isolate	EC_{50} value[y]	0	0.15	0.3	0	0.15	0.3
DL71	0.02	100.0	54.5 a	42.2 a	100.0	21.0 a	14.3 a
DL72	0.02	100.0	58.7 a	42.4 a	100.0	25.2 a	15.0 a
AP5	0.42	100.0	85.4 a	72.9 ab	100.0	60.4 b	32.7 ab
AP6	0.43	100.0	89.3 a	86.6 b	100.0	83.7 b	42.2 b

[x]lower case letters indicate significant differences within a column (P=0.05). The absence of letters indicates no significant differences among treatments. Values are means of three independent experiments.

[y]The EC_{50} values were determined in mycelial growth tests and represent means of three different experiments.

Preplant Crop Rotation for Nematode Management - A Replacement for 'Stacy' Wheat

Andrew P. Nyczepir
USDA-ARS

For annual crops, crop rotation is one of the oldest methods for managing nematodes. Crop rotation has not been utilized as extensively for perennials, such as peach; however, rotation as a preplant management strategy for nematodes on peach may have a role in an IPM program. Previous research in two separate field plot trials has shown preplanting wheat (*Triticum aestivum* L. em Thell) cv. 'Stacy' for three (3) years suppressed the population density of the ring nematode (*Mesocriconema xenoplax*) and prolonged tree survival on peach tree short life (PTSL) sites. Preplanting wheat was also as effective as preplant methyl bromide fumigation, and it is currently recommended in the 2003 SE Peach, Nectarine and Plum Pest Management and Culture Guide as a preplant management strategy for suppressing ring nematode.

In recent years, one of the major concerns for growers and researchers has been the availability of Stacy wheat seed for planting. This year has been no exception. In October 2003, I received a number of telephone calls inquiring about where one can purchase Stacy wheat for suppression of ring nematode. As most of you know, wheat varieties generally lose favor over time for one reason or another. Higher yielding varieties with better insect and disease resistance are just a few reasons why a specific variety may be removed from the market. In the case of Stacy wheat, newer varieties with higher yield potentials, better disease resistance, and more suitable forage production were factors contributing to its demise. Therefore, finding replacement wheat varieties that are as good or better than Stacy in suppressing ring nematode populations was investigated.

Five commercially available wheat varieties were evaluated for host susceptibility to the ring nematode, *M. xenoplax*, in the greenhouse. Stacy wheat and the ring nematode susceptible peach cultivar, Nemaguard, were used to verify nematode suppression and infectivity, respectively. Pots without plants were designated as a fallow treatment. The soil in each pot was infested with approximately 2,000 ring nematode adults and juveniles. Ten replications of each plant species and five replications of fallow were arranged in randomized complete blocks on benches in an air-conditioned greenhouse. Six months after soil infestation, all test treatments were harvested, nematodes were extracted from a 100-cm^3 soil subsample, and counts were conducted. The nematode reproduction factor [Rf = final population density (Pf) of all life stages divided by initial population density (Pi)] was calculated as a measure of host susceptibility among the different plant treatments. Cultivars were grouped into three classifications based on the nematode Rf rating, as follows: nonhost, Rf = 0; poor host, Rf = 0.01 - 1.99; and suitable host, Rf > 2. The study was repeated once.

In both tests, Nemaguard peach supported greater reproduction of ring nematode than the wheat varieties and fallow soil treatments (Table 3). Most wheat varieties in both tests were

similar to Stacy in subduing nematode reproduction. All wheat varieties were classified as either nonhosts (Rf = 0) or poor hosts (Rf = 0.01 - 1.99) to the ring nematode. No ring nematodes were detected in soil planted to Coker 9835 in either test.

In conclusion, all wheat varieties tested were comparable to Stacy in suppressing ring nematode reproduction. According to the University of Georgia 2003-2004 Wheat Production Guide, all wheat varieties, except Stacy, are listed as being commercially available or grown in Georgia.

Table 3. Reproduction of *Mesocriconema xenoplax* on wheat and peach cultivars in the greenhouse after 180 days.[a]

		Ring nematodes per 100 cm^3 of soil		Rf[b]	
Plant species	Cultivar	Test 1	Test 2	Test 1	Test 2
Peach	Nemaguard	1,017[c]	2,300[c]	7.65[c]	17.29[c]
Wheat	Pioneer 26R61	0 b	11 a	0.00 b	0.08 a
	Pioneer 2691	0 b	8 a	0.00 b	0.06 a
	Pioneer 2684	8 a	2 a	0.06 a	0.01 a
	Coker 9663	0 b	2 a	0.00 b	0.01 a
	Coker 9835	0 b	0 a	0.00 b	0.00 a
	Stacy	0 b	2 a	0.00 b	0.01 a
Fallow		0	3	0.00	0.02

[a]Data are means of 10 replicates, except fallow which had 5 replicates. Means within a plant species and column followed by the same lower case letter are not different ($P \leq 0.05$) according to Fisher's protected least significant difference.
[b]Rf = reproductive factor (Pf/Pi), where Pi = initial population density of 133 *M. xenoplax* per 100 cm^3 soil.
[c]The single-degree-of-freedom comparison between the means for peach vs. combined wheat and peach vs. fallow was highly significant ($P \leq 0.01$).

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Editor, Phillip M. Brannen
Horticulture Assistant Editor, Kathy Taylor
Entomology Assistant Editor, Dan Horton
Weed Science Assistant Editor, Wayne Mitchem

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PUTTING KNOWLEDGE TO WORK

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