http://ipm.osu.edu/fruit/index.html

THE OHIO STATE UNIVERSITY

Newsletter Extension

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Calendar

July 21 & 22: Small Fruit Tour, Wooster/Mt. Hope area. Pre-tour gathering begins Wednesday evening at Maurer Farms near Wooster. Thursday morning the group begins its self-guided, self-driven tour at Farmers' Produce Auction in Mt. Hope. Demonstrations at OARDC in Wooster round out the afternoon, and the day ends at Moreland Fruit Farm near Wooster with a walking tour, discussion, and fruit pies. $5.00 registration fee. For more information contact Mike Pullins at (614) 249-24424.

July 27: Southern Ohio Vineyard and Winery Tour, starts at 2:00 p.m. at Painter Fork Vineyard, Bethel (Clermont Co.), continues at Kinkead Ridge Vineyard, Ripley (Brown Co.), then on to Moyer's Vineyard, Manchester (Adams Co.). Concludes with dinner at Moyer's Restaurant. Dinner reservations required by July 21. Please call Moyer's Restaurant (937) 549-2957. For more information contact Maurus Brown at OARDC (330) 263-3681.

August 5: Young Grower Tour, northwest Ohio. Designed for, but not limited to, producers and their spouses age 40 and under. The tour will showcase the innovative growing techniques of northwestern Ohio fruit and vegetable growers. Board buses beginning at 8:00 a.m. at the OARDC Vegetable Crops Branch 2 miles south of Fremont. Stops will include the Antesberger Farm, Knipp Farms, Hirzel Canning Company (where barbecue chicken and brat lunch will be served), Northern Ohio Pickle Company, Bench's Greenhouse, Rimelspach Produce Company. Buses return to OARDC-Fremont at approximately 4:30 p.m., where dinner will be served. Cost is only $10 per person. Call OFGS or OVPGA at (614) 249-2424.

New Produce Sales Opportunities

Blooming Grove Wholesale Produce Auction, Monday, Wednesday, and Friday, 10:07 a.m. Located on Free Road between St. Rte. 603 and St. Rte. 13, near Shiloh, Richland County.

Bainbridge Wholesale Produce Auction, Monday, Wednesday, and Friday, 11:00 a.m. Open to all growers and buyers in Ohio. 5 miles south on Rte. 41 from Bainbridge, just off U.S. Rte. 50, 15 miles north of U.S. Rte. 32. For further information, call Brad Bergefurd or Melissa at the OSU Extension Enterprise Center (800) 860-7232

Drought Conditions Persist

Sources:

http://www.nws.noaa.gov/oh/hic/current/drought/

http://www.cpc.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

Conditions in Ohio as of July 10, 1999

Region	**Category of Drought**
NW Ohio	Moderate
WCentral Ohio	Moderate
SW Ohio	Severe
SCentral Ohio	Severe
Central Ohio	Severe
NCentral Ohio	Moderate
NE Ohio	Severe
Central Hills	Severe
NE Hills	Severe
SE Ohio	Severe

Cleaning Storages and Apple Bins to Minimize Postharvest Decay Problems

Source: Dave Rosenberger, Plant Pathology, Highland, Cornell University, Scaffolds Fruit Journal, July 13, 1999

Postharvest decay has emerged as a significant problem in Empire fruit held in CA storage for more than six months after harvest. Most of the losses are attributable to blue mold decay caused by fungicide-resistant strains of Penicillium expansum. Postharvest treatment with thiabendazole (TBZ) plus diphenylamine (DPA) does not control these strains of P. expansum. Treated fruit often develop more decay than non-treated fruit because they become inoculated when postharvest treatments are applied. Even non-treated fruit can develop decay if they are placed in a room with a high level of airborne inoculum. Losses can approach 15% in severely affected lots of fruit.

Decay problems are currently more severe in some storage operations than in others. Apparently, not all storages have the fungicide-resistant strains of P. expansum that are responsible for the most severe problems. However, the Empire decay problem is becoming more widely distributed each year. Where problems have occurred in the past, action must be taken this summer to minimize potential decay problems with the 1999 Empire crop.

Why are decay problems usually limited to Empire? We are still working to answer that question, but it appears that Empire fruit are uniquely susceptible to blue mold decay. Experiments conducted during the past two years have shown that P. expansum can invade Empire fruit through the stems if spores contact the ends of stems after harvest. Invasion through stems does not occur in Empire fruit held in air storage, and the incidence of decayed fruit in CA storage is usually low until fruit have been stored for at least six months.

The ability of P. expansum to cause infection through stems had previously been reported for pears but not for apples. We do not know if other apple varieties can be infected through stems. In other apple varieties, the postharvest pathogens seem to be limited to fruit that can be accessed via wounds in the fruit skin. There are relatively few wounded fruit in a bin, so the prevalence of decay presumably remains low except for varieties like Empire that can become infected through the stem. The susceptibility of Empire fruit to infection via stems explains the prevalence of blue decay in uninjured Empire fruit from CA storages.

Fungicide-resistant strains of P. expansum presumably developed because of repeated exposure to postharvest fungicides. Spores of P. expansum can survive a long time on storage floors and walls and on apple bins. The spores survive very well even on bins that are stored outdoors under hot and dry conditions. Pathogen strains that survive on bins are recirculated through postharvest fungicide treatments year after year, and this pathogen population gradually became resistant to TBZ and DPA. As the population became resistant to the postharvest treatment, the incidence of decays increased and bins became a bit more contaminated each year. As a result, more spores were available for infecting Empire stems and the incidence of decays increased even more.

There are no quick or easy solutions for preventing postharvest decays of Empire fruit in storages where the fungicide resistant strains are rampant. The biocontrols that have been registered for postharvest use on apples either do not work or are not available. As a result, many storages have high populations of a pathogen for which there is no effective postharvest treatment.

At this point, sanitation measures seem to be the only option for breaking the cycle of increasing inoculum levels and increasing losses to postharvest decays. Using clean bins and minimizing exposure to inoculum is probably the only way to reduce Empire decays for the next several years. Sanitation measures will need to be completed during summer before bins are taken back out to the orchards.

The following steps should help to reduce inoculum and minimize Empire decay problems during the coming year:

1.) Disinfect packinghouse and storage room floors and walls during summer. Floors and walls of storage rooms become contaminated with spores that will be blown into the air by forklift traffic and evaporator fans when storages are refilled in the fall. Therefore, the storage rooms and access hallways should be sanitized before rooms are refilled. Quaternary ammonia compounds are registered for disinfecting storage rooms and can be purchased from your chemical supply dealer. Follow directions on the product labels. In addition to eliminating inoculum, cleaning storage rooms during summer will also eliminate foul odors caused by non-pathogenic bacteria and fungi (molds) that sometimes develop on storage walls. Storage odors can persist in packed fruit, so cleaning storage walls and floors may improve fruit quality at the same time that it reduces the inoculum for post harvest decays.

2.) Do not apply postharvest treatments to Empire fruit in 1999. Recirculating postharvest solutions accumulate and recirculate spores. In the absence of effective postharvest fungicides, it will be essential to avoid the spore contact that is inevitable in postharvest drenchers.

3.) Whenever possible, use new bins for long-term storage of Empire. Fruit that are moved into storage without postharvest treatment can still develop decay problems if exposed to high levels of airborne inoculum that can originate with contaminated bins. In an experiment conducted in fall-winter of 1997-98, we applied different treatments to replicated bins of fruit from the same orchard block. Some bins received fungicide treatments and others were moved into storage without any postharvest treatment. When fruit were removed from CA storage on July 15, the incidence of decay in the treated and untreated fruit was similar (about 200 decayed fruit/bin). Non-treated fruit became infected as a result of airborne inoculum that presumably originated with other contaminated bins in the same CA room. If other apple varieties are to be stored in the same rooms with Empire, then bins for those fruit must also be reasonably clean so as to avoid contaminating air in the CA room.

4.) Sanitize contaminated bins: Bins from storage rooms that had an Empire decay problem will be heavily contaminated with spores of fungicide-resistant P. expanusm. The same is true for bins that came out of packinghouses while decayed fruit were being removed from packing lines. We know from spore trapping experiments that packinghouses are full of airborne spores of P. expansum. These spores land on and persist on bins unless the bins are disinfected. The spores can be carried on both plastic and wooden bins.

Chlorinated water in the flotation tanks in packinghouses may help to sanitize bins as they are emptied. However, in many cases the empty bins are recontaminated before they are removed from the packinghouse. Running bins through chlorinated water provides no residual protection against recontamination. If bins coming out of chlorinated water dumps are allowed to dry inside the packing room, then they will certainly be recontaminated with airborne spores. Furthermore, treatment with chlorinated water will not eliminate fungal inoculum that is embedded in smashed or decayed apples remaining in the bottoms of the bins.

Fruit with blue mold decay usually sink to the bottoms of bins as the bins are emptied in water flotation tanks. These decayed fruit are sometimes left in the bottoms of bins after the bins are nested and removed from the packinghouse. Decayed fruit in the bottoms of bins can provide millions of spores for infecting the next year's crop. No sanitizing treatment (except perhaps steam) will effectively sterilize decayed fruit.

To sanitize bins, the bins must be unbundled, all decays must be removed, visible dirt or spore accumulations on the bin floors and walls must be scrubbed out, and the bins must then be run through a drencher that contains a labeled quaternary ammonia compound. Quaternary ammonia is considered more effective than chlorinated water for disinfecting bins. The same equipment that is used to apply postharvest treatments can probably be used to apply quaternary ammonia sanitizers, but the outlets on the drencher may need to be modified to ensure good coverage of the bins.

Sanitized bins should be kept separate from bins that have not been sanitized. If sanitized bins are moved back into non-sanitized storage rooms, or if they are transported through contaminated passageways, then the bins will become recontaminated with airborne spores that are stirred up by the forklifts. Bins that appear "clean" and that came from storage rooms where decays were not a major problem can probably be used without sanitizing for apple varieties other than Empire. However, unsanitized bins that appear "clean" have the potential for recontaminating sanitized bins if they are stored in the same CA room.

Sanitizing several thousand or tens of thousands of apple bins is no small job, and the benefits have not been verified in controlled experiments. However, I see no alternative for handling badly contaminated bins, especially if those bins will be reused to hold Empire fruit in long-term CA storage. Without effective fungicides for controlling blue mold, spores from contaminated bins will contaminate storages and will contribute to continued problems with postharvest decay in Empire.

Peapod Home Delivery

Sources: The Columbus Dispatch, June 6, 1999 (via Dick Funt), Chicago Tribune, June 27, 1999

Several years ago we became interested in Peapod Home Delivery after OSU Extension Specialist Dick Funt had informed us of Kroger's interest. Founded in 1989, Peapod began working with Kroger in 1995 to bring its online grocery service to central Ohio. From their computers, cybershoppers "stroll" Kroger's aisles, selecting from among tens of thousands of grocery items -- from charcoal briquettes to flowers. They can compare prices and nutrition content, order stamps, and fill prescriptions. Peapod employees assemble the orders at Kroger stores and deliver the groceries within a two-hour window selected by the customer. They pay for the service, of course, but fees vary.

Online grocers face huge obstacles in getting orders from store shelves to customers' homes. For one thing, consumers are reluctant to buy groceries online, preferring to tap the melons and eyeball the meat they intend to buy. Few are willing to pay a premium for it. "If you are an active, affluent consumer, you can afford this additional cost," said Roger Blackwell, a marketing professor at Ohio State University. "But the problem is most Americans live their lives so spontaneously, they have difficulty planning anything a week from tonight, let alone knowing when or what they want delivered."

Online grocery sales are expected to mushroom to more than $3.5 billion by 2002, up from $150 million last year. However, they face an uphill battle in the $440 billion-a-year U.S. grocery business.

Actigard - New Fire Blight Control

Source: Kim Maxson & Al Jones, Botany & Plant Pathology, Fruit CAT, Michigan State University, 7/13/99

Just as the human body uses an immune system to defend itself against threatening microbes, plants employ their own defense mechanisms against invading pathogens. Plant defense can range from localized mechanical and chemical defense responses to a systemic expression of defense proteins, which require specific induction, causing "systemic acquired resistance" (SAR).

The successful pathogen is able to initiate infection of plant tissue before the plant can react to its presence. SAR occurs when the plant immediately recognizes the invading pathogen as a threat. In response, the plant begins to produce defense proteins, which are translocated to other parts of the plant and help to defend the plant against the invader. A unique feature of SAR is that an invading pathogen is not needed for induction. Some chemical "SAR-inducers", such as salicylic acid, INA, and BTH (benzothiadiazole), can induce the battery of defense proteins without the plant-pathogen interaction.

The ag-chem industry is using the concept of chemically indeced SAR to induce defense in a variety of crops against a variety of pathogens. Actigard (BTH), from Novartis, has been shown to induce protective activity against such diseases as bacterial spot and speck of tomato, blue mold of tobacco, and leaf blast of rice. This spring, we undertook to determine whether Actigard induces protective levels of defense activity in apple trees against the fire blight pathogen, *Erwinia amylovora*. Challenges facing this evaluation include the optimization of rate and application schedules paired with inconsistent natural disease pressure.

Actigard 50 W at 2 oz/100gal was applied weekly and every other week, and was compared with an AgriMycin (streptomycin) treatment and two control treatments (see table). A severe storm at the end of petal fall spread fire blight inoculum throughout the test area and resulted in severe infection. Weekly applications of Actigard provided about 81 percent control verses 97.6 percent control with Agrimycin. Actigard applied every other week only gave 58 percent control. To re-test the effectiveness of the treatments, terminal shoots were artificially inoculated with E. amylovora. Significantly fewer shoots were infected and less of the current growth was infected following weekly applications of Actigard or of Agrimycin, compared to the control.

In conclusion, Actigard at 2 oz/100 gal applied weekly seems to have potential as a new fire blight control strategy. Future studies are needed with combination treatments involving streptomycin in bloom for blossom blight control and Actigard from before bloom until growth stops. This would reduce the pressure on Erwinia amylovora for streptomycin resistance by reducing the amount of antibiotic introduced to the environment.

Effects of Actigard 50WP on the incidence and severity of fire blight in Jonathan apple trees at East Lansing, MI, 1999

		Natural Infection				**Inoculated Infection**			
Treatment & rate per 100 gallons	**Spray Dates**	**Strikes per tree**		**Percent control**		**Shoots infected (percent)[a]**		**Current growth infected (percent)[b]**	
1. Actigard 50WP - 2 oz.	April 30; May 7, 14, 21, 28 June 4	57.7	bc	81.1	ab	48.0	b	50.9	b
2. Actigard 50WP - 2 oz.	April 30; May 14, 28	124.3	b	58.0	b	95.9	a	88.3	a
3. Agrimycin 17 - 8 oz.	May 7, 11, 14, 21, 28; June 4	7.3	c	97.6	a	42.7	b	52.2	b
4. Inoculated Check	- - -	291.7	a	- - -		98.7	a	97.6	a
5. Un-	- - -	315.7	a	- - -		- - -		- - -	

inoculated Check									

Means within a column followed by the same letter are not significantly different according to LSD ($P<0.05$) Treatments were replicated three times in a randomized complete block design.

Trees were inoculated on May 10 (100 blossoms/tree on 50 spurs) and May 19 (25 shoots/tree, inoculated two leaves/shoot). The natural infection was associated with a severe storm on May 17. Strikes per tree data were collected on June 2.

[a] Percent of 25 shoots per tree that were infected following inoculation with Erwinia amylovora on May 19.

[b] Percent lesion extension data was taken on June 3. It is the mean amount of necrosis on the current season's shoot growth for 25 shoots/tree.

Fruit Observations

Insect Key

AM: Apple maggot
CM: Codling moth
DWB: Dogwood borer
LPTB: Lesser peachtree borer
OBLR: Oblique banded leafroller
OFM: Oriental fruit moth
PC: Plum curculio
PTB: Peachtree borer
RBLR: Redbanded leafroller
SJS: San Jose scale
STLM: Spotted tentiform leafminer
TABM: Tufted apple budmoth
VLR: Variegated leafroller

Site: Waterman Farm, Columbus
Source: Dr.Celeste Welty, OSU Extension Entomologist

Apple: 7/1 - 7/7

RBLR: 0 (down from 10)
STLM: 2755 (up from 2665)
SJS: 816 (up from 181)
CM (mean of 3 traps): 9.7 (up from 3.7)
AM: 0 (unchanged)
TABM: 0 (unchanged)
VLR: 0 (unchanged)
OBLR: 0 (unchanged)

Peaches:

OFM: 6 (down from 11)
LPTB: 4 (up from 3)
PTB: 2 (down from 5)

Site: East District; Erie & Lorain Counties
Source: Jim Mutchler, IPM Scout

Apple: 7/7 - 7/13

RBLR: 10.0 (down from 26.0)
STLM: 225 (down from 900)
SJS: 0.6 (up from 0)
CM: 0.6 (up from 1.0)
OBLR: 9.0 (down from 21.5)
VLR: 0.3 (down from 1.0)
AM: 0.4 (up from 0.1)

Peach:

OFM: 38.3 (up from 9.0)
RBLR: 10.0 (down from 16.8)
LPTB: 30.0 (down from 47.3)
PTB: 4.8 (up from 3.8)

Other pest activity: green apple aphid, potato leafhopper, white apple leafhopper, Japanese beetle, Oriental fruit moth strikes

Beneficials at work: Lacewings everywhere, orange maggot, white maggot, *Stethorus punctum* and other lady beetles

Site: West District; Huron, Ottawa, & Sandusky Counties
Source: Gene Horner, IPM Scout

Apple: 7/7 - 7/13

RBLR: 19.9 (down from 43.0)
STLM: 217 (down from 803)
SJS: 1.6 (up from 0)
CM: 0.7 (up from 0.4)
OBLR: 3.5 (up from 3.0)
VLR: 1.0 (up from 0.5)
AM: 0 (unchanged)

Peach:

OFM: 21.5 (up from 9.0)
RBLR: 42.0 (down from 78.5)
LPTB: 3.5 (down from 5.0)

PTB: 0.5 (down from 4.0)

Other pest activity: Green apple aphid, Japanese beetle, white apple leafhopper, Oriental fruit moth strikes, apple rust mite

Beneficials at work: Lacewing eggs everywhere, banded thrips, white maggot, predator mites.

Site: Wayne County *Source: Ron Becker, Program Assistant, Agriculture & IPM, OSU Extension*

Apple: 7/8 - 7/14

STLM: 39.2 (down from 49)
CM: 4.93 (up from 2.0)
RBLR: 7.0 (up from 5.5)
OBLR: 9 (1 site) (up from 0)
AM: 0 (unchanged)

Peach:

OFM: 35 (down from 60)
LPTB: 4 (down from 7)
PTB: 4 (down from 15)

Ohio Apple Scab, Fire Blight, and Sooty Blotch Activity- SkyBit Products

Central District

Apple Scab:
July 1-3, 6, 7, 10 possible infection & damage
July 4, 5, 8, 9, 11-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Fire Blight:
July 1-7, 9, 10 possible infection and damage; July 8, 12, 14 not active
July 11, 13 active but no infection
Based on Forecasts; July 15 - 17 not active;
July 18 - 21 possible infection and damage

Sooty Blotch:
July 1-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Eastern Highlands

Apple Scab:
July 1, 4, 5, 8, 11 - 14 active but no infection
July 2, 3, 6, 7, 9, 10 possible infection & damage
Based on Forecasts; July 15 - 21 active but no infection

Fire Blight:

July 1- 4, 6, 7, 9, 10, 14 possible infection and damage
July 5, 8, 11 - 13 not active
Based on Forecasts; July 15 - 17 not active;
July 18 - 21 possible infection and damage

Sooty Blotch:

July 1-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Northeast District

Apple Scab:

July 1, 2, 6, 7, 9, 10 possible infection & damage
July 3 - 5, 8, 11-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Fire Blight:

July 1, 2, 6, 7 , 9, 10 possible infection and damage
July 3 - 5, 8, 11 - 14 not active
Based on Forecasts; July 15 - 17 not active;
July 18 - 21 possible infection and damage

Sooty Blotch:

July 1-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

North Central District

Apple Scab:

July 1, 2, 6, 7, 10 possible infection & damage
July 3 - 5, 8, 9, 11-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Fire Blight:

July 1, 2, 6, 7, 9, 10 possible infection and damage;
July 3 - 5, 8, 11 - 14 not active
Based on Forecasts; July 15 - 17 not active
July 18 - 21 possible infection and damage

Sooty Blotch:

July 1-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

West District

Apple Scab:

July 1, 2 possible infection & damage
July 3 - 14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Fire Blight:

July 1-3, 6, 9 possible infection and damage
July 4, 5, 7, 8, 10 - 14 not active
Based on Forecasts; July 15 - 17 not active
July 18 - 21 possible infection and damage

Sooty Blotch:

July 1-14 active but no infection
Based on Forecasts; July 15 - 21 active but no infection

Degree Day Accumulations for Selected Ohio Sites January 1, 1999 to date indicated

	Actual DD Accumulations July 14, 1999		Forecasted Degree Day Accumulations July 21, 1999			
Location	**Base 43° F**	**Base 50° F**	**Base 43° F**	**Normal**	**Base 50° F**	**Normal**
Akron - Canton	2112	1386	2340	2182	1565	1436
Cincinnati	2510	1687	2752	2806	1880	1931
Cleveland	2115	1400	2346	2127	1582	1398
Columbus	2574	1781	2817	2436	1975	1639
Dayton	2381	1614	2624	2495	1807	1698
Elyria	2250	1536	2477	2247	1715	1501
Fremont	2062	1383	2303	2174	1575	1456
Mansfield	2068	1348	2303	2159	1533	1419
Norwalk	2143	1437	2367	2120	1612	1403
Toledo	2176	1468	2406	2115	1649	1400
Wooster	2171	1438	2403	2063	1621	1333
Youngstown	1927	1233	2147	2009	1404	1294

Phenology

	Range of Degree Day Accumulations	
Coming Events	**Base**	**Base 50° F**

	43° F	
Codling moth 2nd flight begins	1355-2302	864-1549
STLM 2nd generation tissue feeders present	1504-2086	952-1201
Apple maggot 1st oviposition (fruit punctures)	1566-2200	1001-1575
Codling moth 2nd flight peak	1587-3103	1061-2212
San Jose scale 2nd flight peak	1934-2591	1271-1874
Apple maggot flight peak	2033-2688	1387-1804
Obliquebanded leafroller 2nd flight begins	2124-3040	1412-2076
Oriental fruit moth 3rd flight begins	2172-2956	1553-2013
Peachtree borer flight subsiding	2230-3255	1497-2309

Thanks to Scaffolds Fruit Journal (Art Agnello)

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