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THE OHIO STATE UNIVERSITY Newsletter Extension

Fruit ICM News

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Calendar

September 21 to 23: Farm Science Review, Molly Caren Agricultural Center, London, Ohio. See 2,100 acres showcasing a dynamic Ohio agricultural industry. For information contact Chuck Gamble at 614-292-4278 or e-mail gamble.19@osu.edu. The web site for the Review is http://frs.osu.edu.

Late Season Threat! CM and OFM Damage to Tree Fruit (Hey you, don't put that sprayer away.)

Source: David Epstein, MSU IPM Program and Larry Gut, MSU Entomology, MSU Fruit Crop CAT, August 24, 2004

Few growers may want to hear it, but putting the sprayer away at this point in the season may result in the discovery of wormy fruit at harvest. This season in particular, the threat of late-season injury from codling moth (CM) and Oriental fruit moth (OFM) is very real. Weather forecasters are calling for a system to move into Michigan today, August 24, with daytime temperatures climbing into the 80's and nighttime temperatures in the upper 60's to 70's for the next week. With this increase in temperature, we should see an increased flight of CM and OFM.

As stated in the July 27, 2004 *CAT Alert* article, cool spring temperatures resulted in many young CM larvae being found in fruit at the end of the second generation. This observation led to a prediction of low moth catches and activity for the first few weeks of the second generation, a prediction that has been observed in many areas.

With temperatures climbing into the 80's this week, adult flight should increase, presenting an increased chance of injury to fruit still on the trees after an accumulation of 250 GDD50 from the start of this increased period of flight activity. The amount of time it takes to accumulate 250 GDD will vary regionally, but could take as few as 10 days with daily mean temperatures of 75F.

This is the time of year that OFM can raise havoc as well. Apple growers should be diligent about monitoring for this pest with pheromone traps and by visual observation. Third generation OFM females have a strong tendency to move in search of suitable hosts. It is common for individuals that have developed in peach to emerge and move into nearby apple orchards.

Larvae that infest apples over the next month or so will likely still be in the fruit at harvest. Indeed, over the past three years in southwest Michigan, OFM larvae have comprised about 50 percent of the worms that caused loads to be rejected by the processor. The incidence of OFM in apples is lower in other Michigan fruit grower regions, but the trend is for increasing occurrences.

Choice of control materials for late season moth activity must include consideration of the various materials' PHI's, and whether the material targets larvae only, or both larvae and eggs. Check your Michigan Fruit Management Guide (E-154) for details. Granulosis virus, with a PHI of only 4 hours, is one control option CM growers may want to consider where PHI is of considerable concern. Sprayable pheromone disruption is a viable late-season option for growers to consider for OFM control.

Options for Postharvest Fungicide Treatments on Apples

Source: Dave Rosenberger, Plant Pathology, Cornell University, Scaffolds Fruit Journal, August 23, 2004

Sanitation measures can reduce the incidence and severity of postharvest decays caused by *Penicillium expansum*, but fungicide treatments may still be needed to achieve acceptable control of postharvest decays. Sanitation reduces or eliminates inoculum that recycles from year to year on bins and in storages; however, sanitation alone will not eliminate inoculum that originates in the field.

Spores of postharvest decay fungi are often present on fruit before harvest because *P. expansum* and *Botrytis cinerea* are present in orchard soils and in organic debris on the orchard floor. These spores can be blown onto fruit prior to harvest, or they can be carried to fruit via soil on bin runners when bins are stacked on trucks or in storage. Spore concentrations on fruit at harvest vary from year to year, but we currently have no way of predicting "bad decay years." As a result, we cannot predict when postharvest treatments might be beneficial and when they will not be needed.

Because postharvest treatments (fungicides, diphenylamine, calcium chloride) are applied using recycling drenches, the treatment can worsen decay problems in the absence of effective fungicides because the treatment solution ensures uniform inoculation of all fruit wounds and stems. The combination of thiabendazole (Mertect 340F) plus diphenylamine (DPA) is still effective for controlling *B. cinerea*, but it no longer controls *P. expansum*. As a result, fruit that is moved into storage without any postharvest

treatment may develop decays caused by *B. cinerea*, but decays caused by *P. expansum* cause minimal losses on non-drenched fruit. The reverse is true for fruit given a postharvest treatment of thiabendazole plus DPA: *B. cinerea* will be controlled, but *P. expansum* will be more prevalent than in non-drenched fruit. In most cases, losses to *P. expansum* are potentially greater than losses to *B. cinerea*. Therefore, postharvest treatments are usually omitted on apples that do not require DPA treatment.

Captan is registered for postharvest treatments and can be used either alone or in combinations with thiabendazole. Some packinghouse operators report that captan treatment helps to suppress postharvest decay, but captan has been inconsistent and only moderately effective in controlled research trials. If captan is used in postharvest treatments, it should be used at the full label rate because lower rates are unlikely to provide any control of *P. expansum*.

A new fungicide, pyrimethanil (trade name: PenBoTec) received a federal registration for postharvest use on apples on August 13, 2004. It is unlikely that this fungicide will receive a New York State registration in time for the 2004 harvest season, but New York State might approve PenBoTec by late winter, at which time it could still be used as a line spray to prevent decay in packed fruit.

PenBoTec is very effective for controlling both *P. expansum* and *B. cinerea*, and it is fully compatible with other postharvest products such as DPA and calcium chloride, although several factors may limit its usefulness, at least initially. Many other countries (including Canada and most European countries) have not yet approved residue tolerances for PenBo Tec, so treated fruit may not be acceptable for export.

Another limitation for using the product in postharvest drenchers is that PenBoTec treatment will likely cost about three times more than Mertect 340F on a per-box basis. Each packinghouse operator will need to determine whether the risks of postharvest decay warrant that level of expenditure for postharvest treatment. The answer will vary, depending on how well the packinghouse has been able to manage decays over the past few years without PenBoTec, how long the fruit will be stored, and the anticipated value of the fruit being stored.

For example, after PenBoTec is approved in New York State, treatment may be warranted for Honeycrisp (a high-value cultivar prone to both stem punctures and decay), whereas treatment may not be warranted for Empire that will be stored for less than 6-8 months.

Storage operators opting to use postharvest fungicide treatments on apples should consider the following:
guidelines for using fungicides in postharvest drenches:

- **Keep drench solutions agitated:** Without agitation, Mertect 340F and captan will settle to the bottom of the treatment reservoir when the system is shut down at night, and the settled product will be difficult to resuspend. Postharvest drenchers should be outfitted with an agitation system capable of resuspending any sediment that settles to the bottom of the tank during periods when the system is shut down. In the absence of a good agitation system, the fungicide concentration will quickly drop below effective levels.
- **Keep drench solutions clean:** Soil introduced into the postharvest treatment tanks carries decay inoculum and makes it more difficult to keep postharvest chemicals in suspension. A pre-wash with a high-volume stream of non-recycling water may be needed to remove soil from bins or equipment before they enter the postharvest drencher. Empty and clean tanks at least as frequently as is required on the DPA labels.
- **Keep drench solutions properly recharged:** The drench solutions should be regularly recharged according to instructions included on the postharvest labels of the products being used.

Apple Marketing Aids

The Ohio Apple Marketing Program continues to make available two popular apple marketing aids. A market handout features 18 of *Ohio's Favorite Apples and Their Uses* on the front-side and favorite

apple recipes on the back-side. A display box of 500 handouts costs $15 (including shipping and handling). To view the display box and handout, click on: http://www.ofbf.org/oamp/oampwebengine.nsf/$LookupFilesType/pa040023web.jpg/$File/pa040023web.jpg.

Attractive, durable metal signs, measuring 24 by 36 inches, are adorned with a color picture of Ohio's bountiful apples above a writeable surface for your advertising messages. Signs are reasonably priced at $30. The handouts and signs are available for order from the Ohio Apple Marketing Program, P.O. Box 182383, Columbus, OH 43218. The items are also available for immediate pickup from Glen Hill Orchards, Mount Vernon and Eshleman Fruit Farm, Clyde. You will save shipping charges for the signs by visiting one of these two farms.

Judging Apple Ripeness

Source: Jill MacKenzie and David Bedford, University of Minnesota Department of Horticultural Science from the MAGA 2001 Summer Tour at Wescott's in Elgin, MN.

One way to judge an apple cultivar's maturity is to taste the fruit from several trees. When the apples taste right, that's when you harvest. Another way is to examine the color of the apple's skin. When the ground color begins to change from green to yellow, the fruit is ripening. There's nothing necessarily wrong with picking by ground color or flavor, but growers can pick fruit at truly optimal ripeness if they also use other methods of determining maturity.

Growers in the big apple-producing states often wait until the skin has a certain percentage of red pigment, then pick. Unfortunately, this method almost guarantees picking apples that are either unripe or over-ripe. Some varieties and color sports appear red before their flavors have developed, while others have begun to soften before they are fully red.

Most consumers aren't looking for a red apple anymore. They're looking for good eating qualities. Our Minnesota-grown apple varieties are known for their unique flavors and textures, so they have an advantage over apples "imported" from other growing regions, but only if you pick them at the right time: when they are both crisp and flavorful.

Begin testing fruit for maturity two or three weeks before you expect it to be ripe. Plan to test once or twice a week. You'll notice the apples softening as they become sweeter.

The trick is to harvest apples that are still firm, but that have adequately developed sugars and aromatics. Select a sample of apples of average size and color for the cultivar, planting, and year. Don't choose damaged apples; they ripen at a different rate. You can use the same apples for three different tests.

Pressure Testing

A penetrometer is a simple device for measuring how firm an apple is. Since texture is at least as important as flavor, you might choose to harvest fruit with more starch and less sugar than you'd otherwise like, if you find that pressure is dropping rapidly. To use the penetrometer, remove a disk of skin from the apples by slicing shallowly. An area about the size of a quarter should be exposed. If you're right-handed (lefties, reverse this!), hold the apple in your left hand, position the plunger against the skinless flesh, and use a smooth motion to push the plunger into the flesh up to the notch. Steady your hand and the apple against something as you insert the plunger, to get accurate results. Read the gauge to find the pounds of pressure per square inch (psi) you had to use to get the plunger into the

apple. Pressure will vary from year to year for any variety, but apples should be firmer than 14 psi.

Starch-Iodine Testing

As apples ripen, starch stored in their flesh is gradually converted to sugar. The starch-iodine test is a way of visually assessing the progress of this conversion. Iodine reacts with starch to form a blue-black compound, so apples that still contain lots of starch are stained black when sprayed with an iodine solution; apples that are more mature will show little or no black stain.

David Bedford's formula for iodine solution: To prepare the iodine solution at the beginning of each season, purchase a one-ounce bottle of tincture of iodine at a drugstore. Pour the entire contents into a one-pint spray bottle. Fill the bottle with water. The iodine solution is light-sensitive, so wrap the bottle in aluminum foil. The solution is poisonous. Label it and store it away from children and pets.

Slice the apples in half along their equators. Taste and then set aside one half of each; spray the cut surface of the other with iodine solution. After about a minute, compare the amount of starch present with a photographic index. Most apples grown in Minnesota follow the Granny Smith chart as they ripen, but you may find the Red Delicious and Golden Delicious charts more appropriate for some varieties.

Apples to be sold immediately should be picked between 4 and 5 on a scale of 0 to 6. Left on the tree longer, they will soften too much. The exception, of course, is Honeycrisp™, which is still firm and crisp when all starch has been converted to sugar. Apples to be stored for few months should be picked between 3 and 4.

Soluble Solids Testing

In this test, a refractometer is used to determine the level of sugar in the apple flesh. Few growers use this test, but some may find it useful. To use the refractometer, clean the prism, then cover it with water. Adjust the instrument to read 0 for water (check this each day). Dry the prism and squeeze a few drops of apple juice from one of the halves you set aside onto it.

Looking into the refractometer, read and record the percentage of sugar. Rinse the prism and dry it before testing juice from another apple. Ripe apples usually contain more than ten percent sugar.

Editor's Notes: Additional information is available at: http://tfpg.cas.psu.edu/part6/part61a.htm

Washington State University Researchers have collected firmness, soluble solids, and acidity data for various apple varieties from several crop years. A full report is available at http://postharvest.tfrec.wsu.edu/EMK2003C.pdf.

Following are brief summaries:

Fuji Apple			
Crop Year	Firmness (lbf)	Soluble solids (%)	Acidity (%)
1992	average 16.9 range 14 to 19	14.9 13 to 17	0.41 0.23 to 0.65

1993	average 16.5 range 11 to 23	14.6 13 to 17	0.34 0.23 to 0.46
2000*	average 15.1 range 12 to 20	13.7 12 to 16	0.26 0.12 to 0.42

*Most packers and growers will agree that the edible quality of Fiji apples in 2000 was not exceptional.

Gala Apple			
Crop Year	Firmness (lbf)	Soluble solids (%)	Acidity (%)
1992	average 16.1 range 14 to 18	13 11 to 16	0.53 0.32 to 0.82
1993	average 16.7 range 13 to 20	13.1 11 to 16	0.42 0.32 to 0.56
1995	average 15.2 range 12 to 18	13.9 12 to 16	0.3 0.22 to 0.38
2000	average 14.6 range 8 to 16	13.3 10 to 15	0.33 0.23 to 0.42

Golden Delicious Apple			
Crop Year	Firmness (lbf)	Soluble solids (%)	Acidity (%)
1991	average 14.5 range 11 to 18	12.8 11 to 15	0.39 0.24 to 0.57
2000	average 13.4 range 12 to 19	13.5 11 to 16	0.40 0.20 to 0.55

Granny Smith Apple			
Crop Year	Firmness (lbf)	Soluble solids (%)	Acidity (%)
1995	average 18.7 range 18 to 19	12.9 12 to 13	0.54 0.51 to 0.56
2000	average 16.5 range 11 to 21	12.7 11 to 15	0.58 0.32 to 0.76

Red Delicious Apple			
Crop Year	Firmness (lbf)	Soluble solids (%)	Acidity (%)
1990	average 15.4 range 12 to 19	13.2 11 to 16	0.21 0.14 to 0.44
1991	average 15.8 range 12 to 20	13.3 11 to 15	0.25 0.18 to 0.41

1992	average 14.6 range 12 to 19	13.7 12 to 15	0.32 0.20 to 0.50
2000	average 15.2 range 11 to 18	13.6 10 to 16	0.22 0.11 to 0.33

Other Apple Varieties (2000 Crop Year)			
Variety	Firmness (lbf)	Soluble solids (%)	Acidity (%)
Braeburn	average 15.3 range 12-18	13.1 12 to 15	0.45 0.23 to 0.52
Cameo	average 15.3 range 12-18	13.4 13 to 14	0.32 0.24 to 0.44
Jonagold	average 10.8 range 10-13	13.6 12 to 15	0.39 0.27 to 0.52
Pink Lady	average 18.3 range 16-21	14.0 14 to 15	0.69 0.56 to 0.8

Degree Day Accumulations for Ohio Sites August 25, 2004

Location	Degree Day Accumulations Base 50º F	
	Normal	Actual
Akron-Canton	2059	2187
Cincinnati	2654	2841
Cleveland	2153	2148
Columbus	2594	2454
Dayton	2446	2531
Kingsville	1945	2016
Mansfield	2048	2167
Norwalk	2207	2147
Piketon	2646	2761
Toledo	2192	2140
Wooster	2205	2034
Youngstown	1937	1987

Terminal Market Wholesale Fruit Prices August 26, 2004

Source: Chicago http://www.ams.usda.gov/mnreports/HX_FV010.txt
Detroit http://www.ams.usda.gov/mnreports/DU_FV010.txt
Pittsburgh http://www.ams.usda.gov/mnreports/PS_FV010.txt

	Chicago	Detroit	Pittsburgh

Apples, cartons 12 3-lb film bags	**IL** U.S. Fancy Jonathan 2 1/4" up 16.00	**MI** U.S. ExFcy Earligold 2½" min 15.00-15.50 Paula Red 2½" min 15.50 Ginger Gold 15.50-16.00 U.S. Fancy Jersey Mac 2½" min 16.00-16.50 U.S. Fancy Paula Red 2½" min 15.50-16.00	**NY** U.S. Fcy Tydeman Red 2 ½" up 15.75
Apples, cartons cell pack, U.S. ExFcy			**NY** Jersey Mac 80s 22.00 Tydeman Red 100s 22.00
Apples, cartons cell pack, U.S. Fancy			**NY** Paula Red 80s 18.50 Tydeman Red 100s 18.50
Apples, bushel cartons loose		**MI** U.S. ExFcy Jersey Mac 2 3/4" up 14.00	
Blueberries, 12 1-pt cups/lids	**MI** 20.00	**MI** med-lge & med 20.00-22.00, mostly 20.00-21.00	**MI** med-lge 22.00-23.00
Blueberries, 12 1/2-pt cups/lids		**MI** med 18.00-18.50	
Nectarines, 25 lb cartons loose, various yellow flesh varieties	**IL** 2½" up 15.00-17.00		**NJ** 2 3/8" up 17.50-18.00
Nectarines, ½ bu cartons loose, U.S. One various yellow flesh varieties		**MI** 2½" up 17.00 **NJ** 2 3/4" up 20.00-20.50	
Peaches, 25 lb cartons loose, various yellow flesh varieties	**IL** 2½" min 12.00-13.00 **MI** 2¼" up 9.50-10.00		**WV** U.S. ExOne Redglobe 2 3/4" up 13.25 2½" up 8.25-10.00 **PA** U.S. Fancy Loring 2½" up 13.75-14.00
Peaches, ½ bu cartons loose, U.S. ExOne various yellow flesh varieties		**MI** 2 3/4" up 16.00 **WV** 2½" up 8.50 2¼" up 6.50-7.00	
Peaches, ½ bu cartons loose, U.S. One various yellow flesh varieties		**MI** 2 3/4" up 12.00-16.50 2½" up 12.50-13.50 2¼" up 8.00	
Prune Plums, 30 lb cartons	**MI** Bluefire 1¼" up 12.50	**MI** U.S. One Stanley 1¼" min 15.00	**MI** U.S. One Stanley 1¼" min 14.00-

			15.50

The intent of listing terminal market prices is to provide information available in the public domain. It is not intended for price setting, only to assist growers in evaluating the value of their crops. Producers need to remember that the prices listed are gross, and consideration must be given to marketing costs, including commission, handling charge,

Pest Phenology

Coming Events	Degree Day Accum. Base 50º F
Codling moth 2nd flight peak	1337 - 1977
Lesser appleworm 2nd flight peak	1554 - 2292
Oriental fruit moth 3rd flight begins	1613 - 1901
Peachtree borer flight subsides	1708 - 2232
Spotted tentiform leafminer 3rd flight peak	1776 - 2134
Obliquebanded leafroller 2nd flight peak	1779 - 2117
San Jose scale 2rd flight subsides	1785 - 2371
Redbanded leafroller 3rd flight begins	1812 - 2092
Oriental fruit moth 3rd flight peak	1821 - 2257
Rebanded leafroller 3rd flight peak	1876 - 2342

Thanks to Art Agnello, Cornell University

Fruit Observations & Trap Reports

Insect Key
AM: apple maggot
CM: codling moth
ESBM: eye-spotted budmoth
LAW: lesser apple worm
LPTB: lesser peachtree borer
OBLR: obliquebanded leafroller
OFM: oriental fruit moth
PTB: peachtree borer
RBLR: redbanded leafroller
SJS: San Jose scale
STLM: spotted tentiform leafminer
TABM: tufted apple budmoth
VLR: variegated leafroller

Site: Waterman Lab, Columbus

Dr. Celeste Welty, OSU Extension Entomologist

Apple 8/18 to 8/25/04	
Redbanded leafroller	21 down from 38
Spotted tentiform leafminer	2436 up from 2016
San Jose scale	9 same as last wk
Codling moth	11.0 up from 8.0
Lesser appleworm	22 up from 5
Tufted apple budmoth	4 down from 4
Variegated leafroller	1 down from 5
Obliquebanded leafroller	0 same as last wk
Apple maggot (sum of 3 traps)	38 up from 0

Site: Holmes, Wayne, and Wayne Counties
Ron Becker, IPM Program Assistant

Apple: 8/18 to 8/25/04	
Redbanded leafroller	Holmes: 13 up from 8
	Wayne: 7 up from 6
	Medina: 5.5 down from 8.8
Spotted tentiform leafminer	Holmes: 600 up from 420
	Wayne: 200 down from 282
	Medina: 622 up from 510
Oriental fruit moth	Holmes: 0 same as last wk
	Wayne: 0 same as last wk
	Medina: 0 same as last wk
Codling moth	Holmes: 1.7 down from 4.7
	Wayne: 15.1 down from 21.6
	Medina: 2.4 same as last wk
Apple maggot (sum of 3 red ball traps, no lure)	Holmes: 8 up from 2
	Wayne: 0.3 down from 1
	Medina: 0.8 same as last wk

Lesser appleworm	Wayne: 10 up from 9
Peach 8/18 to 8/25/04	
Lesser peachtree borer	Holmes: 0 same as last wk
	Wayne: 11 up from 4
	Medina: 0 same as last wk (using mating disruption)
Peachtree borer	Holmes: 0 same as last wk
	Wayne: 3 same as last wk
	Medina: 0 same as last wk (using mating disruption)

Ron's Notes: Light red mite, light to moderate aphid with many beneficials (lacewings, ladybugs, and orange maggots) present. Sooty blotch and fly speck starting to appear. Apple maggot went over threshold in one Holmes County orchard.

Site: West District; Huron, Ottawa, Richland, and Sandusky Counties
Lowell Kreager, IPM Scout/Technician

Apple 8/17 to 8/24/04	
Apple maggot (3 trap sum)	0.0 same as last week
Codling moth	1.2 down from 1.9
Lesser appleworm	3.4 up from 3.4
Oriental fruit moth	1.5 up from 0.3
Redbanded leafroller	11.9 up from 11.7
San Jose scale	0.3 down from 3.8
Spotted tentiform leafminer	367 down from 1081
Peach 8/17 to 8/24/04	
Lesser peachtree borer	3.7 up from 3.2
Oriental fruit moth	0.2 down from 1.3
Peachtree borer	1.4 up from 1.0
Redbanded leafroller	16.4 up from 13.4

Beneficials include lady beetles

Site: East District; Erie and Lorain Counties
Jim Mutchler, IPM Scout/Technician

Apple 8/17 to 8/24/04	
Apple maggot (3 trap sum)	3.8 up from 0.9
Codling moth	3.8 down from 4.7

Lesser appleworm	13.3 up from 6.0
Oriental fruit moth	9.7 up from 5.5
Redbanded leafroller	5.9 same as last wk.
San Jose scale	0.0 same as last wk.
Spotted tentiform leafminer	1020 up from 900
Peach 8/17 to 8/24/04	
Lesser peachtree borer	9.0 up from 7.7
Oriental fruit moth	9.5 up from 8.0
Peachtree borer	7.5 down from 10.0
Redbanded leafroller	6.5 up from 4.0

Beneficials include lacewing eggs and adults, lady beetles, brown lacewings, and stigmaeiid mites.

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