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THE OHIO STATE UNIVERSITY Newsletter Extension

Fruit ICM News

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Calendar

March 10: Ohio Berry Growers School, OSU Piketon Research and Extension Center, Piketon, Ohio. Presenters for this year's school include Dr. Barclay Poling (North Carolina State University), Dr. Fumiomi Takeda (USDA Appalachian Fruit Research Station), and Peter Bierman and Brad Bergefurd (OSU Piketon). For more information call Brad Bergefurd at (740) 289-3727 or e-mail at bergefurd.1@osu.edu.

March 28: North Central Fruit Crops Breakfast, Vanson's Restaurant, Monroeville, Ohio; 8:00 a.m. followed by pesticide update at 9:00 a.m. Contact Ted Gastier at Huron County Extension, (419) 668-8210.

June 30: Ohio Fruit Growers Society Summer Tour and Meeting, Patterson Fruit Farm, Chesterland. For more information, contact John Wargowsky at (614) 249-2424, or e-mail at jwargows@ofbf.org.

USDA to Release $100 Million in Assistance to Apple Growers

Source: The Fruit Growers News, Sparta, Michigan

Legislators announced Tuesday, February 27 that the $100 million for market loss assistance for apple growers will soon be released. Growers can apply for market loss assistance through the Farm Service

Agency on or after March 16, which is two weeks after publication in the Federal Register, expected by Friday, March 2. The regulations for an additional $38 million for quality loss assistance are still under review at the Office of Management and Budget (OMB).

The assistance will go to growers who suffered substantial crop losses and damage due to severe weather conditions. Although Congress approved the funds as part of the fiscal year 2001 agriculture appropriation bill, their release had been delayed by a review of USDA regulations conducted by OMB.

"Our apple growers have been hit by hail storms, unfair imports and needless bureaucratic delays," said Senator Carl Levin (D-Mich.). The agriculture appropriations act approved by Congress last fall provides that the Secretary of Agriculture shall use $100 million in Commodity Credit Corporation funds to compensate apple growers for their devastating market losses. Apple growers have lost an estimated $760 million over the past three years due to unfairly priced imports of apple juice concentrate, adverse weather conditions, and rising regulatory costs, according to the USDA.

Fruit growers had been informed that the sign-up period for the market loss assistance program would begin January 18, but that date had been postponed by the USDA while the regulations were being reviewed.

Editor's note: We have been advised that a recent decision will allow growers eligibility for both the Special Apple Loan Program and the Apple Market Loss Assistance Program.

Berries Reduce Effects of Tobacco Smoke Carcinogen, OSU Researcher Finds

Source: Candace Pollock, Associate Editor, OARDC Research Services, e-mail: pollock.58@osu.edu

Certain berries, such as strawberries and raspberries, may do more in the way of preventing diseases than inhibit the development of colon and esophageal cancers. Years of research on strawberries and red and black raspberries have shown that the fruits inhibit the development of those cancers in rats. Now, in collaboration with a scientist from Indiana University, an Ohio State University researcher has discovered that the berries reduce the ability of benzo(a)pyrene, a carcinogen found in tobacco smoke and in the environment, to transform normal cells to cancer cells in the laboratory. The rate of reduction in some cases was as high as 90 percent. Benzo(a)pyrene, formed when gasoline, garbage, or any animal or plant material burns, is carried through the air and water and can affect humans and animals if breathed in or touched. It is most commonly found in coal-, tar- and asphalt-production plants, smoke houses, and municipal trash incinerators and has even been discovered in charcoal-grilled foods and cigarette smoke.

Gary Stoner, head of the Laboratory of Cancer Chemoprevention and Etiology at OSU's James Cancer Hospital and Solove Research Institute, conducted these studies in collaboration with James Klaunig of Indiana University and John Cassady and Nanjun Sun of the OSU College of Pharmacy. Stoner has considered feeding laboratory rats with the methanol extract to see if the lung takes up the berry components in sufficient quantities to protect against cancer induced by benzo(a)pyrene. In previous studies, when whole freeze-dried raspberries and strawberries were fed to rats, they did not protect against benzo(a)pyrene-induced lung cancer. Stoner thinks that the active components in the berries will be more concentrated in the methanol extract and that the extract may be protective. In the meantime, he

is conducting studies with Steven Schwartz of the OSU College of Food, Agricultural, and Environmental Sciences to identify the active components in the methanol extract.

"What exactly do berries do? Well, we know that they inhibit the metabolism of carcinogens so there are fewer mutational events that can lead to cancer. Berries also slow the growth rate of pre-cancerous cells, also reducing the development of cancer," said Stoner. "Now we are trying to understand how that process occurs and what components contribute to the process." Ellagic acid, found in berries, has long been considered to be an anti-carcinogenic and anti-mutagenic compound that contributes to cancer inhibition. Stoner, however, is convinced that ellagic acid is not working alone in preventing, halting, or reversing the development of certain cancers.

"Berries contain many vitamins, minerals, and phytonutrients that individually have been shown to inhibit cancer," said Stoner. "I think that's one of the reasons that cancer inhibition cannot be attributed to ellagic acid alone." Phytonutrients, also known as phytochemicals, nutraceuticals, and phytofoods, is the collective term for disease-preventing compounds in fruits and vegetables. Components like limonoids, phytosterols, terpenes, thiols, and glucosinolates may be unfamiliar to the consumer, but scientists are discovering that these nutrients contribute to warding off diseases such as cancer, diabetes, stroke, and osteoporosis. For example, scientists have found that a diet consisting of fruits and vegetables coupled with exercise helps reduce incidences of stomach, lung, mouth, colon and esophageal cancers by 30-40 percent. Scientists and health-organization experts recommend consumers follow the "Five a Day" program of eating at least five servings of fruits and vegetables per day in order to take advantage of the health benefits. A serving size is equivalent to half a cup.

OSU Leads in Clinical Trials

Source: Candace Pollock, Associate Editor, OARDC Research Services, e-mail: pollock.58@osu.edu

Human clinical trials on the effects of berries to inhibit certain cancers are scheduled to begin in three months, according to the Ohio State University researcher who is heading the project. Gary Stoner, head of the Laboratory of Cancer Chemoprevention and Etiology at OSU's James Cancer Hospital and Solove Research Institute, said preliminary studies will begin sometime in May to determine if certain berries, including strawberries and black raspberries, inhibit the development of esophageal and colon cancers in humans.

His most current research found that feeding cancer-induced rats 5-10 percent of freeze-dried black raspberries in their diet over a 36-week period reduced the development of colon tumors by 50 percent. Malignant colon tumors were inhibited by 80 percent.

Similarly, in 25-week studies, strawberries and black raspberries reduced esophageal cancer by 50-60 percent. Such findings were enough for Stoner to seek funding for clinical trials to see if the berries produce similar results in humans.

"If the berries provide protection in animals, they might also provide protection in humans," said Stoner. The clinical trials will focus on two conditions: Barrett's Esophagus and Familial Adenomateous Polyposis (FAP). Barrett's Esophagus is a disorder in which the lining of the esophagus goes through cellular changes caused by acid reflux, leading to a type of cancer called esophageal adenocarcinoma. FAP is a rare genetic disease characterized by the development of polyps in the colon. If left untreated it develops into colorectal cancer. Some polyps return even after they have been surgically removed.

Stoner said the preliminary studies would address two issues: level of toxicity, if any, of berries in humans and how well components in berries are absorbed into the body.

"We want to see if berries exhibit any sort of toxicity. I don't expect to see any toxicity at all," said Stoner. "Then we will collect blood to see what components of the berries are taken into the bloodstream and how high of levels can be achieved." For Stoner, finding out what components of berries actually contribute to cancer inhibition has become just as much of a part of his research as determining which berries inhibit which types of cancer. Stoner's research has revealed that dietary strawberries and black raspberries inhibit colon and esophageal cancers in lab rats.

The berries were ineffective in inhibiting the development of lung cancer in mice, however. "It may be a matter of absorption," said Stoner. "The inhibitory molecules in the berries may be absorbed locally in the esophagus and colon but do not get absorbed in the blood at high enough levels to be protective in the lung."

Stoner contends that ellagic acid, long considered to be a potential cancer inhibitor, is not working alone in fighting cancer. Berries contain a variety of vitamins and minerals and a host of antioxidants known collectively as phytonutrients that in some capacity do their part in fighting cancer and also other diseases such as diabetes, heart disease, stroke and osteoporosis. "We think the inhibitory effect of berries is due to the combined effects of many components in them. The amount of ellagic acid in freeze-dried berries is one-fifth to one-tenth the amount we used in early experiments where we showed that ellagic acid by itself could inhibit esophageal cancer in rats," explains Stoner. "Yet the freeze-dried berries are just as active as pure ellagic acid. Therefore, there must be other substances in the berries that are responsible for their cancer-inhibitory effects."

Scientists are just now beginning to understand what phytonutrients are found in fruits and vegetables, but more research needs to be conducted to determine how these components inhibit diseases. To better educate the public on what phytonutrients are, the Produce for Better Health Foundation is teaming up with the U.S. Department of Agriculture to build a database of which phytonutrients are found in fruits and vegetables. The database is scheduled to be completed by this fall.

How to Scout for European Red Mite in Apples

Source: Dr. Celeste Welty, OSU Extension Entomologist

When it is difficult to find any mites in an orchard, then it is obvious that there is no reason to apply a miticide. When mites are found on many leaves and leaves start to show bronzing, then it is obvious that a miticide is needed. But in many orchards, there are low to moderate numbers of mites, and it can be difficult to make a decision about the need to spray. The decision is much easier to make if orchards are scouted every 1-2 weeks for mites.

In Ohio apple IPM programs underway during the past 10 years, a mite scouting procedure developed at Cornell University has been successfully used. Two key features of this procedure are that it uses presence/absence sampling and a variable sample size. Presence/absence sampling means that there is no need to count the number of mites per leaf, but each leaf is rated simply as infested with mites or not infested with mites. The variable sample size ranges from a minimum of 20 leaves to a maximum of 100 leaves, with samples of 40-60 leaves most commonly needed.

Apple leaves can tolerate more mites in late summer than in early summer. The scouting procedure developed at Cornell breaks the season into 3 parts, with a different threshold for each. Although the number of mites per leaf is NOT counted while scouting, the procedure is based on thresholds that are expressed as a number of mites per leaf. In early summer, which in Ohio means from mid-May to mid-June, the threshold is 2.5 mites per leaf. In midsummer, which in Ohio means from mid-June to mid-July, the threshold is 5 mites per leaf. In late summer, which in Ohio means from mid-July to mid-August, the threshold is 7.5 mites per leaf. There are 3 decision charts, once for each of the 3 parts of the season. The older version of these charts is shown on page 41 of the *Midwest Tree Fruit Pest Management Handbook* (OSU Extension Bulletin 506A, printed 1998, cost $4.50). For computer Web users, a newer version of these 3 charts is shown at:

http://www.nysaes.cornell.edu/ipmnet/ny/fruits/tree_fruit/apple.man/erm2.5.html

http://www.nysaes.cornell.edu/ipmnet/ny/fruits/tree_fruit/apple.man/erm5.0.html

http://www.nysaes.cornell.edu/ipmnet/ny/fruits/tree_fruit/apple.man/erm7.5.html

The scouting procedure starts by collecting 4 leaves from each of 5 trees. Each of these is rated as infested or not infested. Determine the total number of leaves infested out of the 20 leaves examined. To see if a decision of spray or no-spray can be made, you need to plot your number of infested leaves on the threshold chart. The first point will fall in one of 3 zones: 1) no treatment needed, resample in 2 weeks; 2) treatment needed; 3) continue sampling until a decision can be reached.

If continued sampling is needed, then take another 10 leaves, rate each as infested or not infested, then add the number infested to your first number so that you have the total number infested out of 30 leaves. Then plot this point on the chart and see if a decision can be made. It is common that you need to continue sampling until 40-60 leaves are taken before a decision can be made. If you have to go to 70 or more leaves, there is an additional decision zone that can be reached, which is to stop sampling but resample again in 1 week.

Control of spider mites on tree fruit

Source: Dr. Celeste Welty, OSU Extension Entomologist

On apples, 2001 is the first year that Savey is allowed post-bloom; its new preharvest interval is 28 days. A similar change was made in the Apollo registration 2 years ago; Apollo now has a 45-day preharvest interval. Both Apollo and Savey are more effective when used post-bloom than pre-bloom. An important difference from other miticides is that Savey and Apollo kill eggs and immature mites but they do not kill adult mites. Savey and Apollo are valuable products because not only do they provide excellent control of European red mite, but they are not toxic to the beneficial predatory mites that also help keep spider mites under control.

On apple cultivars that are not highly susceptible to mites, the recommended management plan is to scout for mites every 1-2 weeks, and apply Savey or Apollo if mites exceed the threshold any time until the 28 or 45-day PHI is reached. This is most effective if preceded by an application of superior oil at half-inch green to tight cluster. If a miticide is needed more than once every 2 years, then a miticide rotation should be used as described in the following paragraphs.

On Red Delicious & other highly mite-susceptible apple cultivars that require a miticide most years, a 3-year rotation is advised.

- In one year, use Agri-Mek at first cover. It is likely that this will give season-long control of mites, but if it does not, then Savey or Apollo can be applied once the threshold is exceeded.
- In another year, use Savey or Apollo at first cover. It is likely that this will give season-long control of mites, but if it does not, then Pyramite or Vendex or Kelthane can be applied once the threshold is exceeded.
- In the third year, use superior oil at half-inch green to tight cluster followed by Pyramite or Carzol at petalfall. It is likely that this will give season-long control of mites, but if it does not, then Savey or Apollo can be applied once the threshold is exceeded.

Another new option on apples is Danitol, a pyrethroid insecticide that differs from other pyrethroids in that it is toxic to spider mites. It is generally not as effective as the other miticides unless used at the maximum rate, and it is toxic to predatory mites, but it is an option in orchards where pyrethroids are used.

On peaches, new options for mite control this year are Savey and Pyramite. Use of Savey in peaches is similar to Apollo, which has been registered on peaches since 1994. Both are allowed only once per year. For best resistance management, it is best not to use only Savey or Apollo year after year. If Savey or Apollo was used one year, then Pyramite or Vendex should be used the next year. The other miticide option for peaches is Carzol, but it can be used no later than petalfall.

Eurpean Red Mite Control on Apples:

Recommendations for 2001 that reflect the recent changes in miticide registrations.

Cultivar	***Timing***			
	Tight cluster (or 1/2" green)	*Pink bud*	*First cover or petal-fall*	*Summer*
Red Delicious & other highly mite-susceptible cultivars	*Year 1:* (use nothing)	*Year 1:* (use nothing)	*Year 1:* **Agri-Mek**[2] at 1st cover	*Year 1:* unlikely to be needed, but use **Savey**[3] (PHI 28 days) **OR** **Apollo**[3] (PHI 45 days) if summer threshold exceeded[6].
	Year 2: (use nothing)	*Year 2:* (use nothing)	*Year 2:* **Savey**[3] **OR** **Apollo**[3] at 1st cover	*Year 2:* unlikely to be needed, but use **Pyramite** (PHI 25 days) if summer threshold exceeded[6].
	Year 3: **oil**[1]	*Year 3:* (use nothing)	*Year 3:* **Pyramite**[4] **OR** **Carzol**[5] at petal-fall	*Year 3:* unlikely to be needed, but use **Savey**[3] (PHI 28 days) **OR** **Apollo**[3] (PHI 45 days) if summer threshold exceeded[6].
Cultivars that are less mite-	**oil**[1] (optional but recommended for	(use nothing)	(use nothing)	**Savey**[3] (PHI 28 days) **OR**

susceptible	resistance management)			**Apollo**[3] (PHI 45 days) if summer threshold exceeded[6].

[1] Oil also helps control San José scale.

[2] Agri-Mek also controls spotted tentiform leafminer and white apple leafhopper.

[3] Apollo and Savey are both limited to one application per year.

[4] Pyramite also suppresses white apple leafhopper and aphids.

[5] Petal-fall is the latest that Carzol application is allowed.

[6] other options are:

Vendex (PHI 14 days), which is not very toxic to predatory mites; does not kill other pests.
Kelthane (PHI 14 days), which is not very toxic to predatory mites; does not kill other pests.
Danitol (PHI 14 days), which is toxic to predatory mites; controls full range of fruit and foliar pests.
Vydate (PHI 14 days), which is *very toxic* to predatory mites; also kills leafhoppers, miners, aphids.

Preliminary Monthly Climatological Data for Selected Ohio Locations February 2001

Weather Station Location	Monthly Precip	Normal Monthly Precip	Year-to-Date Precip	Normal Year-to-Date Precip	Average High	Normal High	Average Low	Normal Low	Mean Temp.	Normal Mean
Akron-Canton	1.57	2.23	3.03	4.39	38.9	35.9	24.6	18.9	31.8	27.4
Cincinnati	1.81	2.69	3.14	5.28	45.4	40.8	28.5	22.7	40.3	31.9
Cleveland	1.63	2.19	3.22	4.23	39.8	35.0	25.0	19.3	32.1	27.1
Columbus	1.37	2.24	2.68	4.42	42.6	38.0	28.0	21.4	35.3	29.6
Dayton	1.69	2.17	2.53	4.30	42.3	38.0	25.8	20.8	34.1	29.4
Mansfield	1.61	2.02	2.84	4.00	38.4	35.0	23.8	18.9	31.1	26.9
Norwalk	1.58	1.73	2.31	3.63	39.8	34.6	25.1	17.1	32.4	25.9
Toledo	2.30	1.73	3.08	3.48	37.3	33.4	23.5	17.0	30.4	25.2
Wooster	1.19	1.97	1.90	3.92	40.8	36.9	25.3	19.1	33.1	28.0
Youngstown	1.51	2.03	2.72	4.16	39.4	34.0	24.4	17.9	31.9	25.9

Temperatures in degrees F, Precipitation in inches

Records set:*Highs - 9th; Cleveland 63, Columbus 66, Dayton 65, Mansfield 61, Youngstown 62*

Record tied: High - 9th; *Cincinnati 67*

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