



Newsletter

Extension

Fruit ICM News

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Calendar

July 10: Ohio Fruit Growers Society Summer Tour, Hirsch Fruit Farm, Chillicothe, OH. Registration for the Summer Tour begins at 8:00 a.m. Member fees are \$15 per family & \$10 per individual; nonmember fees are \$20 & \$15. Orchard tours will begin as soon as the first tour wagon is full. Registrants will be able to purchase morning refreshments and a noontime meal. The Hirsch farm produces a mix of high quality tree and small fruit products and operates a retail farm market. They have 32 acres of apples (30 varieties), six acres of peaches, one acre of nectarines, and small acreage of pears and plums. They have also diversified into strawberries, black raspberries, blackberries, concord grapes, and asparagus. For more info about the summer tour, call Tom Sachs at 614-249-2424.

July 23: Licking County Twilight Fruit School, Branstool Orchards. Contact Howard Siegrist at 740-349-6900 for more information.

Antioxidants Are Good For You

Source: Richard C. Funt, OSU Horticulturalist

Antioxidants are compounds or groups of compounds that neutralize unstable molecules in humans. Unstable molecules may damage DNA, cell membranes, or other parts of the cell and are called free radicals. If the radicals contain oxygen atoms, the molecules are called oxygen free radicals or reactive oxygen species. They take away electrons (process called oxidation). Antioxidants yield their electrons and reduce the damage.

Antioxidants can be vitamins A, C, and E, lycopene, and/or ellagic acid. One way to measure the antioxidant value of berries is to add up these individual compounds and come up with a numeric sum. However, this method can miss the target because some antioxidants are not known and the list of antioxidants seems to grow as science prints more data.

The best approach is to measure total antioxidant action by oxygen radical absorbency capacity or ORAC. The antioxidant score is based on the rate of decay of proteins. The Oregon Raspberry and Blackberry Commission and the Wild Blueberry Association of North American have promoted their berries as having a high ORAC score.

New ORAC scores may be 1.5 to 3.0 times higher than those formally published, because of new, more reliable tests for antioxidant activity. Thus there will be confusion in the media as to those berries which contain the highest levels of antioxidants. Fresh berries, as compared to freeze dried berries will differ in ORAC.

Antioxidants are good for you. This statement is based on credible research. Most of the positive results come from foods rather than large doses in pills. Future antioxidant activity may be done by calculating the overall antioxidant activity in any given diet per day. Thus, one may consume fresh blueberries on Monday, red raspberries on Tuesday, and black raspberries on Wednesday, etc.

Reports indicate that blueberries are higher in ORAC value at 24.0 than strawberries at 15.4. Ohio State freeze dried black raspberries range in ORAC value from 235 to 414 using the same equivalent per gram. In this example, fresh black raspberries should be compared to fresh blueberries. Overall, berries are high in antioxidants, but before we make claims in the marketplace growers need comparisons based on research using the same scientific method and equipment. This will reduce the confusion in the media.

Black Raspberries: Potentially Powerful Agent in the Fight Against Colon Cancer

Source: Holly Wagner, OSU Research Communication
<http://www.osu.edu/researchnews/archive/brberry.htm>

There is a potentially powerful biological weapon for health - a mix of compounds suspected of thwarting colon cancer - hiding deep inside the juicy sweetness of a black raspberry. And if it can be harnessed, it could play a major role in preventing the second leading cause of cancer deaths in the United States.

In a recent study, rats that were injected with a cancer-causing agent and then fed a berry-rich diet had 80 percent fewer malignant tumors compared to rats that had no berries in their diet.

For years, scientists have touted the health benefits of eating fruits and vegetables. They're only now starting to gain an understanding of what compounds give certain foods a healthful edge. Black raspberries are rich in several substances thought to have cancer-preventing properties, said Gary Stoner, a study co-author and a professor of public health at Ohio State University. Stoner is also a researcher at the university's Comprehensive Cancer Center.

Such substances are called antioxidants. The researchers also compared the antioxidant activity of black raspberries to that of blueberries and strawberries, two fruits with suspected chemo-preventive effects. Black raspberries prevailed in the comparison by as much as 40 percent. "We were surprised by how much difference there was between the antioxidant activity of the raspberries vs. the other fruits," Stoner said. The research appears in the current issue of the journal *Nutrition and Cancer*.

Rats were injected with azoxymethane (AOM), a carcinogen that causes colon tumors. After two weeks of exposure to AOM, the animals were placed into four groups and fed diets mixed with 0, 2.5, 5 or 10 percent freeze-dried black raspberries. Two additional groups of rats, which did not receive AOM, served as controls. The two latter groups were fed a diet containing 0 or 5 percent freeze-dried black raspberries, respectively.

Nine weeks after the final injection of AOM, researchers looked for the development of tiny lesions in the colon called aberrant crypt foci (ACF). Although ACF rarely occur in humans, the lesions can develop into polyps in rats. In humans, polyps are benign masses of tissue which, if left untreated, could develop into malignant tumors.

Every rat injected with the carcinogen AOM developed the ACF lesions. While most of these lesions go away on their own, Stoner said, some may eventually develop into malignant tumors. In rats fed diets supplemented with black raspberries, the number of malignant tumors seemed to correspond with the amount of freeze-dried berries fed to a rat - the more berries a rat ate, the fewer tumors it had.

At the end of the study, the prevalence of adenocarcinomas or malignant tumors was reduced by 80 percent in the rats that ate the most black raspberries in their diets. "That's a much higher reduction than I thought we'd see," Stoner said.

Adenocarcinomas were reduced by 28 and 35 percent, respectively, in the groups eating diets of 2.5 and 5 percent black raspberries. This reduction is based on the average number of tumors found in rats that had been injected with AOM and fed a berry-free diet.

The tumors were smaller in the rats that ate freeze-dried berries - diets of 2.5, 5, and 10 percent yielded reductions in tumor size of 28, 42, and 75 percent, respectively, when compared to the animals not fed the berries.

The researchers also measured urinary levels of 8-OHdG, a compound that is related to the degree of oxidative damage in the body. The process of oxidation produces free radicals, which can damage cells as well as genetic material. Free radicals are thought to play a role in the onset of cancer. Berries reduced the level of 8-OHdG in the urine by 73, 81, and 83 percent in the 2.5, 5 and 10 percent berry diets, respectively. "This suggests that berries bind up a good portion of free radicals, preventing them from causing damage in the body," Stoner said.

In addition to measuring the levels of some of these chemo-preventive compounds, Stoner and his colleagues compared the antioxidant activity of the black raspberries to that of strawberries and blueberries. Previous studies suggested that these two fruits had antioxidant activity superior to that of

other fruits commonly eaten in the United States, but researchers had not studied black raspberries.

Using a device that measured each fruit's ability to absorb free radicals, the researchers found that black raspberries topped the charts: these berries exhibited 11 percent more antioxidant activity than did blueberries and 40 percent more than strawberries.

One reason for the raspberries' seemingly stellar health advantage may be their richness in compounds such as anthocyanins, which give berries their almost-black pigment; phenols, such as ellagic, coumaric and ferulic acid; calcium; and vitamins such as A, C, E, and folic acid. All of these substances are known chemopreventive agents, Stoner said.

Fresh black raspberries are undoubtedly beneficial, but they are also expensive and can be hard to come by. Freeze-dried berries have as much nutritional content as fresh berries do, but the freeze-dried version isn't readily available to consumers, Stoner said. He tells people to hold off on getting discouraged, though. "The results of this study would translate in humans to eating two large bowls - or four cups - of fresh black raspberries each day," he said. "That may seem a bit extreme. People need to know that these animals are given whopping doses of a carcinogen. It's conceivable that a much lower dose would be effective in humans."

It's also good to keep in mind that the National Cancer Institute continues to recommend four to six helpings of fruits and vegetables each day. "We're just suggesting that people make one of those helpings berries," Stoner said.

The research was supported in part by a grant from the Ohio Department of Agriculture. Stoner conducted the research with Ashok Gupta, Ronald Nines, Laura Kresty, Wendy Frankel, Suzy Habib, Krista La Perle and professor of food science and nutrition Steven Schwartz, all with Ohio State; Gabriel Harris of the National Institute of Occupational Safety and Health in Morgantown, W. Va.; and Daniel Gallaher of the University of Minnesota, Twin Cities.

New Insight on Pollinators May Aid Strawberry Production

Source: Roger Williams, OARDC Entomologist, written by Candace Pollock, Extension Communications

A steady rainfall soaks strawberry fields in this town just outside of Dayton, but the weather doesn't deter Ohio State University entomologists from trekking through standing water and mud to record the growth progression of strawberry blooms - food for many insects whose pollination transforms the flowers into fruit. "The blooms have to be open wide enough for the insects to get in and pollinate," said Ohio State research assistant Diane Hartzler, pointing to blooms that were either partially or fully open. "If the blooms don't get pollinated, the result is irregular fruit, or no fruit at all."

Though no pollinators were to be seen on this wet day, such observations are giving university researchers a better handle as to how insects, namely native feral or wild bees, affect strawberry fruit set, development, and yield. "People used to think that honey bees were the main pollinators of strawberry plants. They pollinate brambles like raspberries and blackberries," said Roger Williams, Ohio State leader of small fruit entomology with the Ohio Agricultural Research and Development Center in Wooster, Ohio. "Though other insects like ants and beetles help pollinate strawberries, we have found that the primary pollinators are native bees."

Williams said the startling conclusion came after three years of identifying bee species that were visiting strawberry fields in Wooster and Moreland, Ohio. The researchers recorded 19 different species, all of which were native except the honey bee. Bee species included carpenter bees, leaf cutting bees, orchid bees, bumblebees, digger bees, cuckoo bees, and small, metallic bees of the family Halictidae. "We didn't know what to expect, as not much literature exists that describes strawberry pollinators," said Williams.

Williams and his associates have expanded their research to other areas of the state in the hopes of compiling a comprehensive guide of bee pollinators. The goal of their work is to more clearly define which species pollinate strawberry plants, how field placement affects pollination, and ultimately establish a new market of beekeeping in Ohio. "More and more growers want to get their crop off earlier in the season. If we can identify which bee species pollinate fields in certain areas, then we may be able to create a new opportunity for beekeepers to provide those species to the grower," said Williams.

The honey bee, European in origin, clearly dominates the beekeeping industry in Ohio. Over 5,000 apiaries, or places where colonies are kept, exist in every county in the state. Honey bees are essential to Ohio's vegetable production, as the insects account for 80 percent of all crop pollination.

Though honey bees do pollinate strawberry plants, Williams said it's clear that native bees are the main pollinators, a discovery that could give both strawberry production and beekeeping a boost. "One reason why we want to look into identifying and possibly marketing native bees is because of the recent problems honey bees have with mites and diseases," said Williams. "Also, if the strawberry plant doesn't get pollinated, it affects fruit size, fruit quality, and overall market value."

Williams said that where strawberry fields are located in the landscape might also have an impact on how often the plants are pollinated. In their studies, the researchers found that strawberry fields located near native habitats, like woods, swamps, ponds, and prairies, had higher berry development and fewer deformed berries than those strawberry fields found in and around residential areas.

Peachtree Borers

Lesser Peachtree Borer & Peachtree Borer

Source: Midwest Tree Fruit Pest Management Handbook
http://www.ca.uky.edu/agc/pubs/id/id93/ch_2.htm

Damage: These borers attack the trunk and limbs of stone fruit trees, especially peaches. The peachtree borer is a pest of young trees, and a single borer can kill a tree. The lesser peachtree borer prefers to attack mature trees. Peachtree borer injury occurs a few inches above or below ground, and lesser peachtree borer injury may occur anywhere on the trunk or limbs where larvae can get under dead bark.

Appearance: Adult peachtree borers are moths that look more like wasps. The adult female has a dark blue-black body with an orange band on the abdomen, dark blue front wings, and clear hind wings. The male is blue-black, marked with narrow yellow bands on the abdomen, thorax, head, and legs; front wings and hind wings are clear, but the edges and veins are outlined with blue-black scales. The male is 3/4- to 1 1/4-inches, the transparent portions of his wings are tinted with yellow, and at least three to four narrow bands of yellow are usually visible on the abdomen. Eggs are small, oval, reddish brown, and hard. The larva is dull white with a brown head and three pairs of short jointed legs. Larvae are 1

1/4-inch when fully grown.

Adult male and female lesser peachtree borers are similar to each other in appearance and also look like wasps. Lesser peachtree borer moths are slender and dark blue with some pale yellow markings; both pairs of wings are clear, except for the edges and veins that have blue-black scales. Lesser peachtree borers resemble the male peachtree borer. Larvae of the lesser peachtree borer are similar to other clearwing borer larvae. They are about 1 inch when mature. The head is light brown and the body is creamy white, but some individuals may be pinkish.

Life Cycle and Habits: The peachtree borer overwinters as larvae under the bark and resumes feeding and completes its larval stages in spring and early summer. When fully grown, the larva pupates under bark or in the soil near the tree base, then emerges as an adult. Adults start to emerge in mid-June; emergence peaks in midsummer and extends into September. Emergence is greater on days after a rain. Soon after adults emerge, the female moths lay eggs under bark scales or on rough bark. Each female lays about 400 eggs. Eggs hatch in 8 to 10 days into larvae that bore into the tree. The peachtree borer has only one generation per year.

Lesser peachtree borer overwinters as larvae underneath the bark. Larvae of all stages except the first may be found during the winter. The larvae feed for a period in the spring before burrowing just below the surface of the bark to pupate. Borers remain in the pupal stage from 18 to 30 days before emerging as adults. Female moths lay eggs in small clusters in cracks and crevices near wounds between ground level and 8 feet high. Females lay an average of 400 small oval, reddish brown eggs. Larvae begin to hatch in 8 to 10 days and burrow into the bark, often entering through cracks caused by other factors such as winter injury, pruning scars, or machinery wounds. Moths emerge from early May until late September. There are two generations a year, with adult emergence in May and June, then again in August and September.

Monitoring and Thresholds: While pruning in early spring, look for symptoms of borer. If symptoms are found, then an intensive control strategy is needed. To determine the most appropriate time to apply insecticide, a sticky trap or bucket trap baited with a pheromone lure can be used to monitor activity of peachtree borer or lesser peachtree borer. Traps for peachtree borer should be hung 3 feet from the ground and set up in late May. Traps for lesser peachtree borer should be hung 4 to 5 feet above ground and set up in late April. It is important to notice when emergence begins (when the first moth is trapped) and when emergence reaches a peak (when the number of moths trapped per week is highest).

The pheromone lure for each of these pests also can attract other similar clearwing borers such as the lilac-ash borer. Trapped moths thus should be examined carefully to be sure the correct species is being counted. If a trap for lesser peachtree borer is set up in the same planting as a trap for peachtree borer, the two traps should be separated by at least 60 feet to minimize trapping of non-target species.

Chemical Control: Control needs to target small borer larvae before they bore into trees. Control may also be achieved by fumigant action of the insecticide, which can kill larvae already in trees at the time of application. An insecticide with long residual action gives the best control of peachtree borer. Current recommendations are in the *2002 Commercial Tree Fruit Spray Guide*.

Protection from peachtree borer is most critical during the first 3 to 5 years after planting. When new trees are planted, the roots and crowns should be dipped in insecticide before planting; this will protect them from borers during their first year. In established plantings, insecticide should be applied as a bark drench at a rate of 1/2 to 1 gallon of spray mix per tree. Thorough coverage is necessary. The insecticide should run down the trunk and soak the ground at the base of the tree. Any prunings, debris, or weeds at

the base of trees should be removed so that they do not block the treatment. With lesser peachtree borer, an insecticide should be applied as a bark drench to the trunk and scaffold branches at a rate of at least 1/2 to 1 gallon of spray mix per tree.

The best time to treat and the number of insecticide applications needed for borer control depend on whether trees are known to be infested with these pests. One insecticide treatment is adequate in orchards where trees show some peachtree borer infestation; the best time to treat is at the time of peak adult flight, which is usually in early August. In orchards where borer injury is found on most trees, two treatments should be made: the first about 10 days after adults begin to emerge (late June) and the second at peak emergence about 6 weeks later (early August). In orchards where trees show signs of infestation by lesser peachtree borer, then an early application is needed to target the first generation in June, as well as an early-September application that targets the second generation. The first treatment should be applied 10 days after adults begin to emerge, which will probably be in mid-May.

Oriental Fruit Moth

Source: Midwest Tree Fruit Pest Management Handbook
http://www.ca.uky.edu/agc/pubs/id/id93/ch_2.htm

Damage: The oriental fruit moth is one of the most serious pests of peaches in the Midwest. Early in the season, this insect damages succulent terminal growth. It attacks fruit in midsummer. Although there may be four to five generations each year, it is the second and third generations that cause most of the damage. In addition to peaches, this insect attacks apples, plums, cherries, pears, and nectarines.

Appearance: The oriental fruit moth is a small (1/4-inch), charcoal-colored moth. Fine alternating bands of light and dark lines on the wings give it a mottled appearance. The small, flat, oval eggs are laid individually or in small clusters on the foliage primarily, usually on the upper leaf surfaces of the terminal growth. The larva is pinkish white with a brown head and is 1/2-inch long when fully grown. The larva pupates in a silk cocoon in crevices in the bark or in litter at the base of the tree. The larva is similar to the codling moth larva, but can be distinguished by the presence of an anal comb.

Life Cycle and Habits: The oriental fruit moth overwinters as full-grown larvae in cocoons in protected places on the trunk or around the base of the tree. They pupate beginning in late March, and moth emergence usually coincides with peach bloom. First-generation larvae tunnel into the young, tender terminal growth near the base of a leaf early in the season. The larvae may tunnel down the center of the twig for 2 to 6 inches before completing development or exiting and moving to another shoot. This injury causes dieback or flagging of these twigs. Larvae often damage two or three twigs before reaching maturity. These larvae can complete their development in less than a month.

Larvae of subsequent generations feed on fruit, when available, and twigs. As the twigs harden, the partially grown larvae leave them and enter the fruits to feed. Larvae commonly bore to the center of the fruit and feed around the pit. Larvae feeding on the fruit often causes it to drop. Young fruit often exude gum from the entrance and exit holes left by the larvae. Damaged fruit that remain on the tree are distorted. Occasionally, the larvae may tunnel into the fruit through the stem. In such instances, there may not be any apparent evidence of how the larvae entered the fruit after it was harvested.

Monitoring and Thresholds: Pheromone traps are available for this insect to monitor moth activity and effectively time sprays. Traps are placed in the interior of the tree canopy at eye level or higher just

before bloom. One trap per 10 acres is recommended for commercial orchards, with a minimum of two traps. Sprays for the first generation should be applied 6 days after peak flight, which coincides with peak egg laying. Examine trees regularly in the early spring for signs of wilted shoots. Examine wilted shoots carefully to determine if oriental fruit moth was the cause. Young trees with vigorous new growth are often very susceptible to this injury. Detection of early season shoot damage indicates the potential for fruit damage by later generations.

Mating Disruption: Some producers in Michigan and on the West Coast have successfully adopted mating disruption strategies for oriental fruit moth management in peaches. With mating disruption, pheromone dispensers are placed throughout the orchard. As the pheromone is released from the dispensers, male moths that normally use the pheromone to locate females become confused. This interferes with the mating process. Mating disruption is recommended only for orchards of 5 acres or larger. Mating disruption is expensive and does not eliminate the need for insecticide sprays to control other pests.

Chemical Control: Sprays for the first generation should be applied 6 days after peak flight. This often coincides with the time for plum curculio control. Sprays for the second and third generations need to be applied 3 days after peak flight. Depending on the anticipated harvest date for the fruit, sprays for the third generation may need to be adjusted or omitted in order to meet the necessary pre-harvest intervals (PHI) requirements for certain insecticides.

Eshlemans to the Ukraine

Rich and Betty Eshleman departed Sunday for a three and a half week tour of duty with The Citizens Network for Foreign Affairs (CNFA) in Vinnytsia, Ukraine. CNFA is a non-profit, nonpartisan organization dedicated to stimulating international economic growth in developing and emerging world markets. CNFA is currently working in the food and agriculture sector of the New Independent States of the former Soviet Union - Ukraine, Russia, Moldova, and Belarus; and in southern Africa - Zimbabwe, Mozambique, and Zambia. CNFA is expanding its model of public-private partnerships into different economic sectors and disciplines, and into other developing areas of the globe.

Rich and Betty are agribusiness volunteers who will be providing marketing training and coaching to approximately 30 farmers managing orchards in southern Ukraine. They will be sharing their expertise and making recommendations to improve handling, grading, packing, bargaining, storage, and distribution functions involved in fresh market fruit production. Rich is returning to the Ukraine after volunteering last year, and Betty is pleased to accompany him this year.

Pest Phenology

Coming Events	Degree Day Accum. Base 50F
White apple leafhopper present	123 - 404
Spotted tentiform leafminer sapfeeders present	130 - 325

Plum curculio oviposition scars present	232 - 348
European red mite 1 st summer eggs	235 - 320
San Jose scale 1 st flight peak	229 - 449
Peachtree borer 1 st catch	299 - 988

Thanks to *Scaffolds Fruit Journal* (Art Agnello)

Degree Day Accumulations for Ohio Sites May 22, 2002

Location	Degree Day Accumulations Base 50F	
	Actual	Normal
Akron-Canton	254	354
Cincinnati	441	579
Cleveland	258	333
Columbus	408	442
Dayton	366	455
Kingsville Grape Branch	219	277
Mansfield	252	345
Norwalk	235	326
Piketon	448	595
Toledo	273	319
Wooster	289	316
Youngstown	270	309

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: 5/15 to 5/22/02

RBLR: 0 (same as last week)
STLM: 0 (down from 1)
CM (mean of 3 traps): 11.3 (down from 15.0)
TABM: 0 (same as last week)
SJS: 0 (same as last week)
VLR: 0 (same as last week)
OBLR: 1 (first report)

Note: Biofix for codling moth in Columbus was Monday, May 6, 2002. Degree day accumulations since that date = 104.

Peach: 5/15 to 5/22/02

OFM: 2 (down from 3 last week)
LPTB: 0 (same as last week)

Site: East District: Erie & Lorain Counties

Source: Jim Mutchler, IPM Scout

Apple: 5/14 to 5/21/02

CM: 0.2 (up from 0.1)
STLM: 117 (down from 505)
SJS: 0 (same as last week)
OFM: 4.3 (up from 2.0)
RBLR: 1.0 (down from 2.3)

Peach: 5/7 to 5/14/02

OFM: 0 (down from 0.7)
RBLR: 0 (down from 2.3)

Beneficials present - native lady beetles, green lacewing eggs and adults

Site: West District:Huron, Ottawa, & Sandusky Co.

Source: Gene Horner, IPM Scout

Apple: 5/14 to 5/22/02

CM: 0.1 (up from 0)

STLM: 13 (down from 68)

OFM: 1.0 (down from 4.5)

RBLR: 0.2 (down from 2.3)

Peach: 5/14 to 5/22/02

OFM: 1.4 (down from 1.6)

RBLR: 0.2 (down from 1.5)

SkyBit® Fire Blight Prediction for North-Central Ohio

Observed:

May 1, 2, 7, 8, 11, 13-15, 17-20 : active, but no infection

May 3-5, 10, 21, 22: not active

May 6,9,12, 16: possible infection & damage

Predictions based on weather forecasts:

May 24, 25: possible infection & damage

May 23, 26: active but no infection

May 27-31: not active

SkyBit® Apple Scab Prediction for North-Central Ohio

Observed:

May 1, 2, 6-9, 10, 11-17: possible infection & damage

May 3-5, 10, 18-22: active, but no infection

Predictions based on weather forecasts:

May 24-26: possible infection & damage

May 23, 27-31: active but no infection

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