Ohio Fruit ICM News

Volume 16, Issue 5 June 11, 2012

The Ohio State University

Greetings from Gary

Dear Ohio Fruit Growers:

Happy June to everyone! I would like to thank Dennis and Craig in Northern Ohio for sending me information regarding the freeze damage to their apple crops. Dennis nearly had a total loss while Craig lost his entire crop.

Needless to say, it is really hard to be a fruit grower this year. Growers in Southern Ohio also experienced some significant losses that ranged from 50 to 100% due to freezes on April 13th and 14th. Some orchards on higher elevations suffered less damage.
On a brighter note, small fruits have fared much better.

Blueberries were not significantly affected by the spring freezes. There was an extended bloom period and pollination was quite good in many areas. Blueberry growers in southern Ohio already harvested early ripening blueberries. "Duke" is one example of such variety. One grower in Central Ohio will open their pick-your-own blueberries next week.

Blackberries only received slight damage to flower buds and the crop is looking good. There was some damage on black and spring red raspberries. However, the yields are still predicted to be quite "on par."

Dr. Gary Gao, Editor

Plasticulture strawberry season was a "mixed bag" in terms of total yields. Some growers who did not put on row covers in a timely fashion experienced severe

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losses. Some who covered their plants religiously with row covers reported record yields. It has been a strange season.

Red raspberries are ready for harvest in Central Ohio while black raspberries will be ready soon. Please let me know how your harvest season is going.

Happy Picking!

Gary Gao

Dr. Gary Gao
Extension Specialist
and Associate Professor

"Jewel" Black Raspberry is ripening and will be ready for harvest soon at OSU South Centers
Photo by Gary Gao
June 7, 2012

Introduction to Commercial Blueberry Production Workshop
A Practical Approach

June 14, 2012
6:00 p.m. – 9:00 p.m.
OSU South Centers Endeavor Center Room 165
1862 Shyville Road, Piketon, OH 45661
$10.00 per person
Download registration brochure and agenda at
http://go.osu.edu/blueberry

Jointly Presented By
Ohio State University Extension South Centers
Ohio Agricultural Research and Development Center
The Ohio State University

Iron Deficiency in Blueberries

By Dr. Gary Gao

Iron deficiency, or chlorosis, is a very common mineral disorder in Ohio blueberries. The symptoms are first exhibited by younger leaves which turn yellow. The deficiency can spread to the entire shoot when it is very severe.

The yellowing occurs between veins while the veins stay green. Leaves may turn completely yellow or, in severe cases, reddish brown.

Blueberry plants are not able to take up iron from soil at a high soil pH. Iron is much more available at a lower soil pH.

To correct iron deficiency, apply an iron chelate to the soil or to the leaves. The iron chelate molecule is able to be taken up by the plant at a higher pH. A suggested rate is one pound of iron chelate per 100 gallons of water.

Apply the solution until runoff begins. Refer to the product information label for rates. Iron chelate may need to be applied several times. The more permanent and less expensive solution is to lower the soil pH with elemental sulfur or ground sulfur. However, lowering pH takes time.

It is also possible that copper or manganese deficiency is causing yellowing of leaves. A leaf test should reveal which mineral element is at deficient level.

Iron Chlorosis in blueberries at OSU South Centers
Photo by Gary Gao

Controlling Bird Damage in Blueberries with Netting

By Dr. Gary Gao

I receive quite a few questions about controlling bird damage in blueberries. Various techniques have been tried, and some are more successful than others.

At the OSU South Centers, we use netting to protect our blueberries. This year, we used netting typically used for grapes and so far it has done an excellent job. Our blueberry variety is "Blueray." Many of the berries have started to ripen and will be ready for harvest soon.

Above
Netting for bird control in blueberries at OSU South Centers

Right
Heavier bird netting used at OSU South Centers in 2011

Photos by Gary Gao

There are other kinds of netting materials available. We used a much heavier type netting last year and it too worked very well. Netting materials come in white, black and green colors. I do not know if colors make a big difference. I may have to find a grant to research it.

In the meantime, I believe netting is just about the only surefire way to stop hungry birds from eating your profit away, even though netting can be very expensive.

If you have better and legal methods for controlling bird damage, please let me know. Email me photos too if you would like to share with our readers and fellow growers.

I do not think this bird problem will go away. We definitely need to figure out an effective way to address this problem!

Sunburn of Apples

By Dr. Jozsef Racsko

From the 1990's, as apple growers adopted high-density plantings on size-controlling rootstocks, which considerably enhanced direct sun exposure of the fruit, the incidence of sunburn in apples increased markedly.

Currently, 6 to 10% crop loss can be calculated in Ohio in unprotected orchards on dwarfing rootstocks. Besides the primary external damage caused by pre-harvest exposure of the fruit to elevated solar radiation, sunburn may predispose affected fruit to other physiological disorders such as watercore, bitter pit, 'Fuji' stain, lenticel marking, sunburn scald in 'Granny Smith', internal browning, or to various pathogens that may gain entrance into the fruit through the affected area.

Types of damage

Sunburn is a physiological disorder of apple fruit, which is produced by over-exposure to solar radiation. Based on the symptoms and the components of solar radiation by which they are induced, three distinctly different types of sunburn exist:

1. Sunburn browning is the most prevalent type occurring on sun-exposed fruit, and is caused by the concomitant action of radiant heating and UV-B exposure. It occurs when fruit surface temperature reaches 113° to 120° F (depending on varieties), the ambient air temperature is generally 86° F or higher. The symptoms are yellowish, brownish patches on the sun-exposed side of the fruit (Fig. 1A). The discoloration associated with sunburn browning has been correlated to alterations in the pigmentation of the peel, i.e. decreases in chlorophyll and anthocyanin concentrations and increases in carotenoid and flavonol concentrations in the peel. Damage occurs on the surface of the fruit but do not penetrate into the core tissues.

2. Sunburn necrosis is a pure thermal death of the skin and underlying flesh tissues of the fruit caused by excessive radiant heat (Fig. 1B). It occurs when the fruit surface temperature reaches 126° F for as short as 10 minutes. No light exposure is necessary for the formation of this type of sunburn. Symptoms are generally dark brown necrotic spots on the exposed fruit surface.

3. Photooxidative sunburn is the third type, which develops on previously shade-grown fruit upon sudden exposure to the direct sun. These apples are not acclimated to high sunlight; they have been covered by leaves or other fruits within a cluster or even located inside the canopy. Exposure can occur after hand thinning or selective picking, after shifting of a branch as fruit load increases, after summer pruning or even after leaving harvested apples uncovered in the bins after harvest or during transit to the packing shed.

Photobleaching of the suddenly exposed fruit surface causes white discoloration, which can easily turn to necrotic spots (Fig. 1C).

Factors affecting damage incidence

From the above sunburn types, sunburn browning has the greatest economic importance, while sunburn necrosis and photooxidative sunburn generally do not cause significant crop loss in apple orchards. Damage incidence depends on cultivar susceptibility and various cultural management practices. While 'Honeycrisp', 'Granny Smith' and 'Jonagold' seem to be susceptible to sunburn, 'Gala' and 'Jonathan' damage less. 'Red Delicious', 'Fuji' and 'Golden Delicious' are somewhere

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Figure 1A—Sunburn Browning

Figure 1B—Sunburn Necrosis

Figure 1C— Photooxidative Sunburn

in between, regarding susceptibility. Sunburn injury appears to be more prevalent on dwarfing rootstocks (e.g. on B.9 or M.9) in high-density plantings because of the greater degree of fruit exposure than in conventional (lower density) planting systems. Also, trees in N-S row orientation seem to produce more fruit with sunburn damage than trees planted in E-W orientation. In N-S row direction, fruit located on the western side of the row are in shade of the canopy in the morning while eastern fruit are exposed in this period. At this time, i.e. in the morning, air temperatures and thus fruit surface temperatures usually do not exceed the threshold temperatures at which fruits are damaged.

Suppressing sunburn

As sunburn symptoms do not disappear once formed, their protection methods involve prevention only. Sunburn formation can be prevented three different ways;

1. Climate ameliorating techniques reduce fruit surface temperature, and therefore the possibility of the formation of heat-dependent types of sunburn (sunburn browning and sunburn necrosis). These techniques involve evaporative cooling, the use of shading nets and fruit bagging. Evaporative cooling (EC) involves applying water to trees, preferably through overhead sprinklers in order to reduce heat stress. Besides its apparent benefits in many cultivars for sunburn control and fruit color improvement, other factors should be considered before investing and starting to operate an EC system; such as high cost of installation and high water requirement, an EC system must also be subjected to regular check-ups.

Shading or hail nets are primarily installed for preventing hail and bird damage, but it

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has great efficacy in preventing sunburn damage by reducing the intensity of direct solar radiation. The color of the net seems to be key aspect in the effectiveness of the shading net. Due to optical properties of the nets and specific needs of apple cultivars for light quality for color development, it was found that black nets are suitable for single-colored green or bi-colored apple cultivars with good coloration or those otherwise susceptible to sunburn. Red nets are generally recommended for red cultivars.

Bagging of individual apple fruits was initially used to prevent fruit injury by insects and diseases, and to obtain a smooth finish of the apples, along with uniform skin color. As a positive "side-effect," bagging also protects apples from sunburn. This protection method has a high labor demand and it more common in Asia than in the US where labor costs are very high.

2. Sunburn suppressants are sprayable materials and have physical mode of action; they cover the fruit surface and change the optical properties of the cuticle by increased reflection or absorption, or by reduced transmission of the infrared, visible or ultraviolet radiation. There are two major types of suppressants are currently on the market: particle films and carnauba wax emulsion. Particle film technology was developed in the late 1990s for the application of aqueous formulations of chemically inert mineral particles to crop plants, including apples, to become a physical barrier to repel insects, reduce disease, infection, and provide protection from sunburn. Currently, there are various types of particle films available for sunburn control in apples based on their inorganic mineral content; it can be kaolin (Surround® WP, Cocoon™), talc (Invelop®) or calcium carbonate (PurShade, Eclipse™, Diffusion®). They have common specific characteristics that are: non-lipophilic and generally water-insoluble materials; and providing a white, highly reflective cover on the fruit surface resulting in an increased reflection of ultraviolet and infrared radiation, which are key aspects of reducing sunburn incidence in apples. As the binding of these products on the cuticle is weak, reapplication is necessary after rainfall or wind-rubbing to maintain consistent coverage on the fruit surface. Besides their great efficacy for sunburn control, the major drawback of using particle films on apples is the difficulty of completely removing the white residues from the stem-end and calyx areas of the fruit at harvest.

Carnauba wax emulsion was invented at Washington State University, it contains emulsified carnauba wax, a natural plant wax, as a principal component, which decreases transmission of ultraviolet radiation, and addition of emulsified, organically modified clay to the wax emulsion enhances reflectivity. In contrast with particle film technology, this formulation provides a clean, rain-fast film on apples that is not washed off by rain or overhead irrigation, and does not require specific washing/brushing technology on the packing line to remove residue. It can be effectively combined with evaporative cooling (EC) for better sunburn control due to the combination of different modes of action; the wax emulsion protects the fruit from the harmful UV-B radiation while EC reduces fruit surface temperature.

3. Chemical protectants (vitamin C, vitamin E, antitranspirants, etc.) have also been used to protect against sunburn with success. Recently, extensive research has been initiated at the Ohio State University to elucidate the physiology of sunburn control by abscisic acid under the direction of Valent BioSciences Corp. Results are promising, but the details of application (timing and concentration) have yet to be tested rigorously.

OSU Fruit Specialists

Name and Title	Contact Information	Expertise
Brad Bergefurd Horticulture Specialist OSU South Centers 1864 Shyville Rd. Piketon, OH 45661	Phone: 740-289-2071, ext. 136 Email: bergefurd.1@osu.edu Website: http://southcenters.osu.edu/hort	Small fruit crops and wholesale produce auction development and operations.
Dr. Imed Dami, Associate Professor & Viticulture State Specialist Dept. of Hort. & Crop Science 216 Gourley Hall—OARDC 1680 Madison Avenue Wooster, OH 44691	Phone: 330-263-3881 Email: dami.1@osu.edu Website: oardc.osu.edu/grapeweb/	Viticulture research and statewide Extension & outreach programs. Recommendation on variety selection. Imed is the primary research contact of the viticulture program.
Dr. Doug Doohan, Associate Professor Dept. of Hort. & Crop Science 205 Gourley Hall – OARDC 1680 Madison Avenue Wooster, OH 44691	Phone: 330-202-3593 Email: doohan.1@osu.edu Website: http://www.oardc.ohio-state.edu/weedworkshop/	Weed control in fruit crops.
Dr. Mike Ellis, Professor Dept. of Plant Pathology 224 Selby Hall—OARDC 1680 Madison Avenue Wooster, OH 44691	Phone: 330-263-3849 Email: ellis.7@osu.edu Website: http://plantpath.osu.edu/	Tree fruit and small fruit disease control.
Dr. Gary Gao, Small Fruit Specialist & Associate Professor OSU South Centers 1864 Shyville Rd. Piketon, OH 45661	Phone: 740-289-2071. ext. 123 Email: gao.2@osu.edu Website: http://southcenters.osu.edu/hort	Management of blackberries, raspberries, blueberries, currants, gooseberries, grapes, and strawberries.
Dr. Joseph Kovach Associate Professor, Entomology 138 Selby—OARDC Wooster, OH 44691	Phone: 330-263-3846 Email: kovach.49@osu.edu Website: http://ipm.osu.edu	Fruit IPM, high tunnels
David Marrison, County Director, Assistant Professor & Extension Educator for Agriculture & Natural Resources OSU Extension – Ashtabula County, 39 Wall Street, Jefferson, OH 44047	Phone: 440-576-9008 Email: marrison.2@osu.edu Website: http://ashtabula.osu.edu/	Grape production in northeast Ohio.

OSU Fruit Specialists

Name and Title	Contact Information	Expertise
Dr. Diane Miller, Associate Professor, Tree Fruit Specialist Dept. of Hort. & Crop Science 203A Williams Hall 1680 Madison Ave. Wooster, OH 44691	Phone: 330-263-3824 Email: miller.87@osu.edu	Tree fruit research and Extension.
Steve Prochaska, Extension Educator and Associate Professor, OSU Extension - Crawford County 112 E Mansfield St Bucyrus, OH 44820	Phone: 419-562-8731 Email: prochaska.1@osu.edu	Grape production in northeastern Ohio.
Dr Jozsef Racsko, Tree Fruit Coordinator & Outreach Specialist 205A Williams Hall OARDC-Wooster Wooster, OH 44691	Phone: 330-263-3883 Email: racsko.1@osu.edu	Tree fruit production.
David Scurlock Viticulture Outreach Specialist 118 Gourley Hall – OARDC 1680 Madison Avenue Wooster, OH 44691	Phone: 330-263-3825 Email: scurlock.2@osu.edu Website: oardc.osu.edu/grapeweb/	Evaluation of site suitability for vineyard establishment and all aspects of grape production practices in northern Ohio. David is the primary Extension contact of the viticulture program.
Dr. Celeste Welty, Associate Professor & Extension Entomologist Extension Entomology Rothenbuhler Labs 2501 Carmack Rd. Columbus, Ohio 43210	Phone: 614-292-2803 Email: welty.1@osu.edu http://bugs.osu.edu/welty/index.html	Tree fruit insect and mite control.
Dr. Roger Williams, Professor Dept. of Entomology 202 Thorne Hall ıı OARDC 1680 Madison Avenue Wooster, OH 44691	Phone: 330-263-3731 Email: williams.14@osu.edu Website: http://entomology.osu.edu/	Small fruit insect and mite control.

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If you have articles or events for possible inclusion in upcoming issues of this newsletter, please submit them to:
Dr. Gary Gao
gao.2@osu.edu

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Dave Scurlock

scurlock.2@osu.edu

http://www.oardc.ohio-state.edu/grapeweb/

Ohio Fruit ICM News
Dr. Gary Gao, Editor
Small Fruit Specialist & Associate Professor
OSU South Centers

1864 Shyville Road, Piketon, OH 45661
http://southcenters.osu.edu/hort
740-289-2071, ext. 123
gao.2@osu.edu

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