



# UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

## *Illinois Fruit and Vegetable News*

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*A newsletter for commercial growers of fruit and vegetable crops*

*"We are what we repeatedly do. Excellence, then, is not an act, but a habit." Aristotle*

Address any questions or comments regarding this newsletter to the individual authors listed after each article or to its editor, Rick Weinzierl, 217-244-2126, [weinzier@illinois.edu](mailto:weinzier@illinois.edu). The *Illinois Fruit and Vegetable News* is available on the web at: <http://www.ipm.illinois.edu/ifvn/index.html>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

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**University of Illinois Extension Specialists in Fruit & Vegetable Production & Pest Management**

### *Upcoming Programs*

Numerous educational programs for fruit and vegetable growers are slated for the 2009-2010 winter season. A partial list is presented below, and more details will be provided as the dates approach. Be sure to mark your calendar for the 2010 Illinois Specialty Crops, Organic, and Agritourism Conference January 6-9, 2010, at the Crowne Plaza in Springfield, IL.

- **Illinois Nut Growers Association Fall Meeting. October 18, starting at 10:00 a.m.** at the Madison County Farm Bureau Building, 900 Hillsboro Avenue, Edwardsville, IL. Pot luck lunch, bring a dish to share and your own place setting and drink. For details contact Elizabeth Wahle at [wahle@uiuc.edu](mailto:wahle@uiuc.edu) or 618-692-9434.
- **Good Agricultural Practices and Good Handling Practices Workshop, 8:30 a.m. – 4:00 p.m., November 5, 2009.** Iroquois Room, Kankakee Community College, 100 College Drive, Kankakee, IL. Topics will include an overview of GAP's and GHP's produce safety impacts, good handling practices (post-harvest), vegetable retailer food safety concerns, auditing farms for food safety, educational and implementation resources, crisis and risk management. Cost per participant, including lunch, is \$30 and \$25 for an additional farm/family member (sharing the curriculum). Pre-registration is required by October 20, 2009. You may register online for this program. With this registration opportunity, you may use a credit card and immediately pay and confirm your registration. Online, you may also choose to pay by check which will tentatively register you until your check is received in our office. Additionally, you may call the office to register by credit card or pay in person at University of Illinois Extension, Kankakee County, 1650 Commerce Drive, Bourbonnais, IL 60914. The registration form is on our website: <http://kankakee.extension.uiuc.edu>. For more information, please call 815/933-8337.
- **17th National Small Farm Trade Show & Conference, November 5-7, 2009.** Boone County Fairgrounds, Columbia, MO. For details check <http://www.smallfarmtoday.com/tradeshows/index.html>.
- **Iowa-Illinois Fruit & Vegetable Growers Symposium. December 11, 2009.** Iowa State University Scott County Extension Office, Bettendorf, IA. (More details in future issues of this newsletter.)
- **Illiana Vegetable Growers' School. January 5, 2010.** Teibel's Family Restaurant, Schererville, IN. (More details in future issues of this newsletter.)

- **Illinois Specialty Crops, Organic, and Agritourism Conference, January 6-8, 2010.** Crowne Plaza Hotel and Convention Center, Springfield, Illinois. Check <http://www.specialtygrowers.org/confagenda.htm>.
- **Horseradish Growers School. January 28, 2010.** Gateway Convention Center, Collinsville, IL. (More details in future issues of this newsletter.)
- **Southern Illinois Commercial Tree Fruit School. February 2, 2010.** Mt Vernon Holiday Inn. Mt. Vernon, IL. (More details in future issues of this newsletter.)
- **Southwestern Illinois Commercial Tree Fruit School. February 3, 2010.** First Presbyterian Church, Hardin, IL. (More details in future issues of this newsletter.)
- **Southern Illinois Commercial Vegetable School. February 10, 2010.** Mt Vernon Holiday Inn, Mt. Vernon, IL. (More details in future issues of this newsletter.)
- **Illinois/Wisconsin (Stateline) Fruit and Vegetable Conference. February 15, 2010.** Harvard, IL. (More details in future issues of this newsletter.)
- **Kankakee Vegetable Growers School, February 24, 2010.** Kankakee County Extension Office, Bourbonnais, IL. (More details in future issues of this newsletter.)
- **Illinois Grape Growers and Vintners Association Annual Conference, 2010.** Springfield, IL. (More details in future issues of this newsletter.)
- **Organic Farming Conference, February 25-27, 2010.** La Crosse, WI. (More details in future issues of this newsletter.)
- **Illinois Small Fruit and Strawberry Schools. March 2-3, 2010.** Mt Vernon Holiday Inn, Mt Vernon, IL. (More details in future issues of this newsletter.)
- **International Herb Association Annual Meeting. July 11-15, 2010.** Collinsville, IL. (More details in future issues of this newsletter.)

## *Regional Updates*

**In southern and southwestern IL ...** Signs of fall are everywhere in the southern region except for the dazzling leaf colors so far. Bucks have begun racking trees to remove velvet in preparation for the rutting season, walnuts have dropped, leaves are starting to flutter down, many farm markets without a fruit emphasis have closed or are in their last few weeks, combines are visible everywhere with the start of corn harvest, pumpkin sales are in full force, colds and flu abound, lawn mower use has slowed, its dark coming and going to work, overnight temperatures require a jacket, and mums and asters are in full bloom.

Apple harvest is complete for many growers in the southern-most counties but still has 1-2 weeks as you move to the northern reaches of the region. Growers in Calhoun County are just moving into Fuji, Firm Gold and Braeburn and have at least a week to go before Granny Smith is ready for harvest. Skin color development is outstanding following the below normal day and night temperatures throughout the ripening season. Conditions for summer rots have been very conducive and control has been variable throughout the region depending on the grower's ability to keep an effective protective residue on throughout consistent rainfall. Although color and flavor has been excellent, crop load and size reports are variable depending on location and cultivar. Within the region, southern counties overall had a reduced crop relative to the northern portions of the state, most likely a result of poor pollination and early season injury during bloom.

Grape harvest is also coming to a close, with all but Norton already complete for most of the region. In talking to Brad Taylor of Southern Illinois University at Carbondale, he commented on the unusual occurrence of certain grape cultivars this year having an undesirable low pH while approaching near normal brix and total acids; he specifically experienced it with Traminette. We are interested in hearing from growers about which of their cultivars had this problem, so in addition to sharing this information with us, it would be a good idea for growers to always record numbers through the ripening process. Also this is a good time to identify stressed plants and flag them for future observation. A stressed plant will usually display early season fall color that is bright red. We usually think of leaf roll virus when we see bright red leaves, but the stress may also result from compacted soils, poor fertility, trunk injury, or any number of stress inducing factors. The main point is that once leaves drop, it is more difficult to identify a stressed vine.

The scent of frost is in the air, and grape growers are reminded to remove grow tubes if they have not already, in order to allow the vines to sufficiently harden off prior to a hard freeze. Do not attempt to remove leaves with a caustic material, i.e. lime-sulfur, thinking to force the plant in dormancy. Grape vines achieve maximum dormancy/winter

hardiness if leaves are allowed to senesce naturally on the cane. I might add that the likelihood of winter injury increases if downy mildew was not sufficiently controlled in September and resulted in early leaf drop.

Upcoming meetings: Be sure to check the list at the beginning of this issue for upcoming educational programs, including the Illinois Nut Grower Association Fall Meeting on October 18 in Edwardsville.

*Elizabeth Wahle (618-692-9434; [wahle@illinois.edu](mailto:wahle@illinois.edu))*

**At Dixon Springs**, strawberry plasticulture plantings have been completed, and plants are off and running. Many growers set plants a little earlier this year in an attempt to get a bit more growth this fall than we experienced last year. The planting at DSAC looks good at this time. Growers should monitor plantings for insect and disease problems and treat as warranted.



Plasticulture strawberries (and the employees who planted them) at Dixon Springs.

Harvest of primocane blackberries continues. We are putting additional mulch on our blueberries, and it is the time of the year when growers should be monitoring all fruit plantings for vole problems.

The tomato season was late but fairly good for many southern Illinois growers. The 10 inches and more of rain resulted in the demise of many (most) home gardens, and local demand for tomatoes remained strong all year. The process of cutting string, pulling stakes and removing plastic from tomato and pepper plantings continues. Funny how many pickup truck loads of plastic can be made from just a few rolls of mulch and trickle tape.

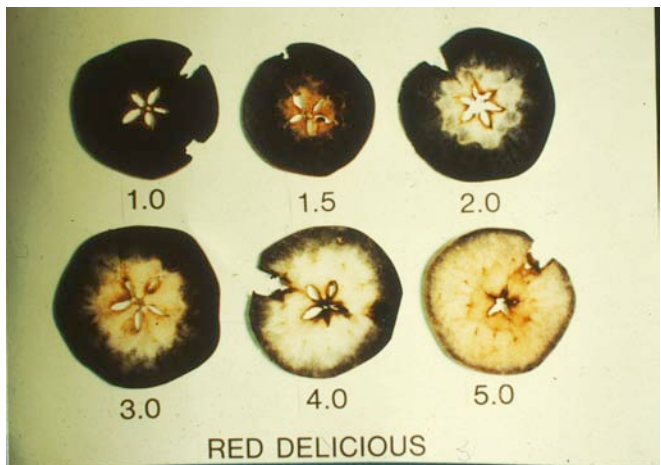
*Jeff Kindhart (618-695-2444; [jkindhar@illinois.edu](mailto:jkindhar@illinois.edu))*

## ***Fruit Production and Pest Management***

### ***Don't store apples for very long this season.***

Iodine tests of most apple varieties grown at our test plots in Champaign showed very little accumulation of starch at harvest. It appears that most of the starch that had accumulated in late summer was quickly converted to sugars. Cloudy and wet weather had prevented adequate photosynthesis, which may have reduced the rate of starch accumulation. Apples intended for storage up to 2 months need a rating of 3.5 to 4 (on a scale of 1 to 5 where the greatest level of starch is 1; see the figure below). Longer storage time, up to a year, will need an iodine score of about 2 to 2.5. The reason is that starch is needed as a storage molecule for sugars. Sugars are what keep the fruits alive in storage. Fruits that have only sugars with no starch will quickly burn that sugar during respiration (yes, fruits do respire

in cold storage, albeit at slower rate). These fruits will not last in storage for much longer. However, fruits that have accumulated sufficient starch reserve should be harvested when some of that starch has started to breakdown. The reason is that you want to make sure that the fruits have reached their optimum maturity before they are harvested. These fruits will last in storage for more than a year given that the storage temperature and the amount of accumulated starch are adequate.



Starch index for “Red Delicious”. Fruits harvested with a starch index of 1.0 -1.5 will not keep in storage for very long. Similarly, fruits harvested with starch index of 4.5 to 5 will not keep much longer either. Fruits to be stored for up to a year should be harvested with a starch index of about 2 to 2.5. Fruit to be stored for only two months should be harvested with at 3.5 to 4.0. (Mosbah Kushad and A. Elgargoti)

Fruits of some varieties such as “Gala” and “Honeycrisp” tend to have different levels of starch. For this reason, these varieties should either be spot picked or you may use the average starch index of about 25 fruits from each block in order to determine the optimum harvest and storage times. The photos below show different levels of starch in fruits from the two varieties. The darker the fruit color the more starch it has.



Starch levels of “Gala” fruits harvested on the same date.



Starch levels of "Honeycrisp" fruits harvested on the same date.

Because of the low starch accumulation in most apple varieties grown throughout the state, my recommendation is not to store the fruits for more than three months, unless you have done the starch test and found that your fruits have adequate amounts of starch.

Mosbah Kushad (217-244-5691; [kushad@illinois.edu](mailto:kushad@illinois.edu))

## ***Vegetable Production and Pest Management***

### ***Pumpkin and other Cucurbit Crops ... Handling and Storage***



Tom Halat and pumpkin ... who weighs the most?

Cucurbit crops vary widely in their harvest time and storage requirements depending on cultivar and location. For example, Jack-o-lantern harvest in Illinois usually starts in mid September to October, while cantaloupe harvest starts as early as mid. July and continues as late as the end of September. Cucurbit crops also vary in their storage requirements. Some, such as summer squash and zucchini, are extremely sensitive to low temperature storage, while others, such as pickling cucumber, are more forgiving. Here are some of the important practices that you can follow to keep pumpkins and other cucurbit crops from being damaged postharvest. Some still apply as the 2009 season comes to a close; others serve as reminders for 2010.

**When to harvest.** Fruits harvested at the correct stage of maturity will keep longer in storage and have better quality. Harvest pumpkins when they reach maturity or full color. For those that have pick-your-own operations, cut the vine off of mature fruits to cure fruit, stiffen the handle, reduce disease infection, and slow down shrinkage. Pumpkins will continue to develop color after harvest, but pay attention to maturity. Fully green fruits will develop some color but those fruits will not store as well as fruits that are harvested mature. Cucumbers are harvested immature in order to keep that crisp and juicy texture and to keep the seed coat from hardening. Squash and summer squash grow very quickly when the temperature is between 77 and 95°F. Picking is recommended every day, every other day, or every 3 to 4 days after pollination in order to maintain the fresh and tender flesh and glossy skin look. Cantaloupes – or more accurately muskmelons – are generally considered climacteric fruits. In other words they produce ethylene and may continue to ripen after they reach a physiological stage of maturity. However, some non-netted melons are possibly non climacteric and so they will not ripen much after harvest. Several parameters are used to determine when to harvest muskmelons. Some older cultivars emit fragrant a aroma or “musk” when fully ripe (as implied by the name). Other factors that have been used to measure muskmelon maturity include development of fully netted skin, yellow or orange ground color, percent soluble solids, development of the abscission zone, and days from anthesis. However, the most widely used factors in determining maturity for harvest of muskmelon fruits is the full slip state of the fruit from the vine. Muskmelon fruits will soften if kept at room temperature but their sugar level will not increase. Most consumers perceive a soft muskmelon to be sweeter than a hard one even when their sugar levels are similar. In contrast to pumpkin and muskmelon, watermelon will not continue to ripen after harvest. Therefore, knowing when to harvest watermelon is important. Most pickers use darkening of the small tendril next to the fruit as an indicator of maturity. Crews of most large farms often pick fruits when the ground color (the side of the fruit in contact with the soil) of the rind turns yellow. Days from planting, usually 75 to 95 days, is used as approximate indicators of harvest maturity. Among consumers, watermelon maturity attracts more attention than any other fruit. Thumbing, shaking, squeezing, and rolling are but a few of the ways consumers use to pick a ripe watermelon. My father’s sure way to pick a ripe watermelon was to hold one end of the fruit between the palms of both hands, usually the end away from the stem, and squeeze while sticking his ear to listen for a crackling sound. If he heard a crackling sound then he was “certain and definite” that the fruit was ripe. I am not sure if there is watermelon in afterlife, but if there is he is out there squeezing the daylight out of them.

**Handling and transportation.** Bruising by mishandling fruit at harvest and during transportation is one of the most serious problems for all cucurbits varieties. Throwing or dropping the fruits in a bin or stacking too many fruits on top of each other often result in unnecessary bruises that affect quality and the cosmetic look of the fruit. Bruised fruits do not store as long and develop bitter taste in storage. Bruised fruits are also more susceptible to chilling injury. To avoid bruising, train your pickers to handle the fruits properly, avoid stacking fruits too high on top of each other, and avoid storing or stacking fruits on top of hard surfaces like concrete. Another important harvest factor that affects quality is keeping the fruit in the sun for a long period. Fruits that have been kept in the sun for more than one hour soften quickly and do not keep long in storage.

**Curing after harvest.** Curing of certain cucurbits, such as pumpkin and hard rind squashes, is a standard practice to harden the peel in order to increase shelf-life and reduce disease infection. Curing of pumpkins also helps the handle stay firm. Do not cure certain types of squash, like acorn and delicate cultivars, so they don’t lose their quality due to the high temperature. Curing is usually done by holding the fruit at 80 to 85°F and about 90% relative humidity for 7 to 10 days in storage, depending on the weather conditions before harvest. Pumpkins can also be cured in the field by placing them in windrows. Dry and warm (but not hot) weather before harvest reduces the need for longer curing time.

**Handling.** Fruit should be harvested early in the morning and placed in the shade soon after harvest. It is best to store pumpkins and other fruits in a cooler. However, any cool space is better than keeping the fruits outside exposed to direct sunlight. There is a misconception among growers that pumpkins should not be stored on a concrete floor. This can only be true if the fruit temperature and the floor temperature are widely different. Moisture (sweating) often builds on the underside of the fruit when the floor temperature is significantly lower than the fruit temperature or vice versa. To prevent this from happening, keep the fruits on a wagon or in boxes for a day before placing them on the floor until the temperature of the fruit and the floor evens up. Another important practice is to avoid stacking pumpkin fruits more than four high. Bruising is not always visible. As it was mentioned earlier, bruised fruits do not store as long as healthy fruits and the taste of edible bruised fruits is not as good as non bruised fruits. Bruising can be prevented by training pickers to handle the fruit properly and to use soft surfaces to place the fruits on. Bruising is more severe in summer squash, slicing cucumber, netted and non-netted muskmelons. More importantly, firm fruits are damaged more by bruising than soft or ripe fruits. The damaged area in bruised fruits rots much faster than the rest of the fruit, which leads to rot development.

**Storage.** Selecting the appropriate storage temperature not only maintains quality but also keeps the fruit in good shape for the longest time possible. Most cucurbit crops can be stored together under similar conditions although a more refined storage temperature and humidity will lengthen the storage period. Also, the shelf-life of different cucurbits will vary depending on the cultivars. The following table lists ideal temperatures for storing different cucurbits.

Ideal storage temperatures and percent humidity for several cucurbit species.

Cucurbit Species	Ideal Storage Conditions		Approximate Shelf-Life
	Temperature (F)	Relative Humidity	
Cucumber pickling	40	95+	7 to 8 days
Slicing cucumber	50-55	85-90	10 – 14 days
Summer squash	50 - 55	95+	7 – 14 days
Winter Squash	45 - 50	50- 70	60 – 90 days
Pumpkin	55 – 60	50 - 70	60 – 90 days
Watermelon	50 - 60	90 - 95	14 – 21 days
Netted muskmelon* cantaloupe	40 – 45	95+	8 to 12 days
Non netted melons- Casaba, Crenshaw, honeydew, etc.,	45 – 50	85 - 90	15 – 20 days

Adopted from Kader, 2002, with modification. \*Storage of netted muskmelons in the commercial trade ranges from 37 to 41°F, however, chilling injury is a serious problem when the fruits are kept at these temperatures for more than a few days. Casaba keeps longer at 50 ° F. "

The above storage temperatures are ideal and so any changes from the above temperatures will reduce the shelf-life as well as the quality of the fruit due to either chilling injury or rapid softening.

**Chilling injury.** Chilling injury is an injury to the skin and outer flesh of mostly fruits of tropical origin when they are exposed to sub-optimal temperatures. Chilling injury can also occur in subtropical and temperate fruits such as apples and pears. Injury is characterized by indentations or pitting on the skin of the fruit. In severe cases the fruit surface will turn brown or soggy. Chilling injury is irreversible but it can be reduced or prevented by storing the fruit at optimal temperatures and in some cases conditioning the fruits at 70 °F for a few hours before they are placed in storage can reduce the symptoms. Chilling injury is different from freezing injury, although the symptoms are somewhat similar. Storing fruits under the optimal temperatures listed Table 1 does not cause chilling injury.

#### Tips for storing pumpkins.

- Harvest fruits at optimum maturity using either date from transplanting or when the rind color reaches full orange color but the color is dull.
- Avoid bruising fruits when picked. Train pickers to treat pumpkins as living tissue, which they are, not dead material.
- Harvest during the coolest time of day and avoid harvesting immediately after a rain storm.
- Harvest fruit with firm handles. Fruits without handles do not store as well.
- Move fruits out of the sun or cover them with cloth but not with plastic.
- Use the right size bins. Too many fruits on top of each other will cause bruising, which can damage the fruit a few days after harvest.
- Cure pumpkins and several other types of squashes before storage, but do not cure acorn squash.
- Store fruits in the coolest place possible if you do not have a refrigerator. If you have a refrigerator then store at the correct temperature.
- Avoid storing pumpkins with crops that require lower temperature storage such as apples, carrots, and pickling cucumber.
- Do not place hot fruits from the field on concrete surfaces so they do not sweat and do not store wet fruits on concrete.
- Wash fruits before storage and preferably add about 100 ppm chlorine to the wash water.
- Inspect fruits regularly and remove rotted ones.

- Do not harvest diseased fruits or damaged fruits.
- If fruits are harvested green then they should be stored at 60° F and not at 50 °F. Low temperature will cause some chilling injury and reduce color development. Green fruits can be turned into orange color by spraying them with a 200 ppm ethrel or ethephon. However, ethrel sprayed fruits do not store very well.

*Mosbah M. Kushad and A. Elgargoti (217-244-5691; [kushad@illinois.edu](mailto:kushad@illinois.edu))*

### ***Less seriously ...***

A leading international agency surveyed several nations about key issues in hunger, food supplies, and food security. The final question was ...

"Would you please give your honest opinion about solutions to the food shortage in the rest of the world?"

This question failed miserably to elicit useful responses because:

In Eastern Europe they didn't know what "honest" meant.

In Western Europe they didn't know what "shortage" meant.

In Africa they didn't know what "food" meant.

In China they didn't know what "opinion" meant.

In the Middle East they didn't know what "solution" meant.

In South America they didn't know what "please" meant.

In the US they didn't know what "the rest of the world" meant.

In Australia they hung up because they couldn't understand an Indian accent.



***University of Illinois Extension Specialists in Fruit Production and Pest Management***

<b>Extension Educators in Food Crop Horticulture</b>		
Bill Shoemaker, St. Charles Res. Center	630/584-7254	<a href="mailto:wshoemak@illinois.edu">wshoemak@illinois.edu</a>
Maurice Ogutu, Countryside Extension Center	708-352-0109	<a href="mailto:ogutu@illinois.edu">ogutu@illinois.edu</a>
Elizabeth Wahle, Edwardsville Extension Center	618-692-9434	<a href="mailto:wahle@illinois.edu">wahle@illinois.edu</a>
Bronwyn Aly, Dixon Springs Agricultural Center	618-695-2444	<a href="mailto:baly@illinois.edu">baly@illinois.edu</a>
Jeff Kindhart, Dixon Springs Agricultural Center	618-695-2444 618-638-7799 (cell)	<a href="mailto:jkindhar@illinois.edu">jkindhar@illinois.edu</a>
Peter Chege, Quad Cities Extension Center	309-792-2500	<a href="mailto:pchege@illinois.edu">pchege@illinois.edu</a>
<b>Extension Educators in IPM</b>		
Suzanne Bissonnette, Champaign Extension Center	217-333-4901	<a href="mailto:sbisson@illinois.edu">sbisson@illinois.edu</a>
George Czapar, Springfield Extension Center	217-782-6515	<a href="mailto:gfc@illinois.edu">gfc@illinois.edu</a>
Doug Jones, Mt. Vernon Extension Center	618-242-9310	<a href="mailto:jonesd@illinois.edu">jonesd@illinois.edu</a>
Russell Higgins, Matteson Extension Center	708-720-7520	<a href="mailto:rahiggin@illinois.edu">rahiggin@illinois.edu</a>
<b>Campus-based Specialists</b>		
Mohammad Babadoost, Plant Pathology	217-333-1523	<a href="mailto:babadoos@illinois.edu">babadoos@illinois.edu</a>
Mosbah Kushad, Fruit & Vegetable Production	217-244-5691	<a href="mailto:kushad@illinois.edu">kushad@illinois.edu</a>
John Masiunas, Weed Science	217-244-4469	<a href="mailto:masiunas@illinois.edu">masiunas@illinois.edu</a>
Chuck Voigt, Vegetable Production (& herbs)	217-333-1969	<a href="mailto:cevoigt@illinois.edu">cevoigt@illinois.edu</a>
Rick Weinzierl, Entomology	217-244-2126	<a href="mailto:weinzier@illinois.edu">weinzier@illinois.edu</a>

Return Address:

Rick Weinzierl  
Department of Crop Sciences  
University of Illinois  
1102 South Goodwin Ave.  
Urbana, IL 61801

