

# VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the  
Purdue University Cooperative Extension Service

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**COLD IN EARLY APRIL** - (*Liz Maynard*) - April began with highs in the upper 60s in Northern Indiana and over 80°F in Southern Indiana. Before the first week was over, the temperature dropped to the upper teens in the North and low 20s in the South. At many locations the temperature remained below freezing for over 24 hours. In N. Indiana at Wanatah, lows remained below freezing and highs below 60 for two weeks.

Injury to cool season crops in the field as well as warm season crops grown in protective structures has been reported. The damage caused by freezing of plant leaves and/or stems is readily apparent: affected parts appear dark green, wilted, and water-soaked after thawing and with time dry out completely. The degree of economic loss will depend on the growth stage of the crop and the extent of the injury. In the case of asparagus, any spears that freeze will be lost, but later-emerging spears should be marketable. For many crops, if the growing point of the plant is not killed, it may be able to recover even if one or more leaves are lost to frost. Harvest may be delayed due to the setback. In the case of sweet corn, even if the growing point is alive, when frozen leaves dry out they may restrict proper emergence or growth (Figure 1).

Much damage to vegetable crops from freezing temperatures is typically apparent soon after it happens. If developing leaves were affected, injury may show up when the leaves expand as distortions in the leaf shape.

Cool temperatures above freezing can also have lasting effects on vegetable crops. Crops in the mustard family, like cauliflower, broccoli, or bok choy may be induced to form a head or flower. When this happens in cauliflower or broccoli, the plant starts to produce a



**Figure 1:** Sweet corn seedlings damaged by freezing temperatures. (*Photo by Chris Gunter*)

head while it is still small, and the head will not reach a marketable size. This 'buttoning' is more likely if the plant has been stressed or is an older transplant. In bok choy and similar crops the flower stalk grows from the center of the head, preventing proper head formation. The exact temperature and length of time required to cause the premature flowering varies among varieties.

Fruit development of tomatoes and peppers is also influenced by temperature. Crops in high tunnels that were protected from freezing may show low-temperature effects on fruit shape or number. For peppers, night temperatures 45 to 50°F during flower development can cause the fruit to be smaller than normal and somewhat flattened, sometimes with a point on the blossom end. Developing tomato flower clusters respond to low temperatures with increased branching and larger flowers when exposed early in development (weeks before buds are visible). Temperatures of 60°F day/50°F night 4 to 5 weeks before flowering of a cluster, may increase the amount of catfaced fruit (large, misshapen fruit with large blossom-end scars) on that cluster.

As I write, much of the state still has a few weeks before the frost-free date (Figure 2, see page 2), but with locations across the state experiencing highs over 70°F

during the third week of April and average soil temperatures approaching 50°F, growing conditions are suitable for cool season crops.



**Figure 2:** Average dates of last 32° F temperature (normal frost) in spring. (Adapted from Caplan, L.A. 1988. *Effects of Cold Weather on Horticultural Plants in Indiana*, Cooperative Extension Service, Purdue University, HO-203)



**DAMPING-OFF - (Dan Egel)** - The cool, cloudy weather in the early April may have contributed to reports of damping-off muskmelon and watermelon seedlings. Damping-off may be recognized by poor stands or seedlings that appear wilted and collapsed. The latter seedlings are often discolored on the lower stem just above the soil line. The root systems of such plants are often discolored. Poor stands may be caused by pre emergence damping-off. That is, the seedlings die before breaking through the soil.

Damping-off can be observed on direct seeded or transplanted seedlings. The most common cause of damping-off are the fungi *Rhizoctonia* sp. and *Pythium* spp. Most soilless mixes used for transplants come Pasteurized (heated to eliminate the above fungi).

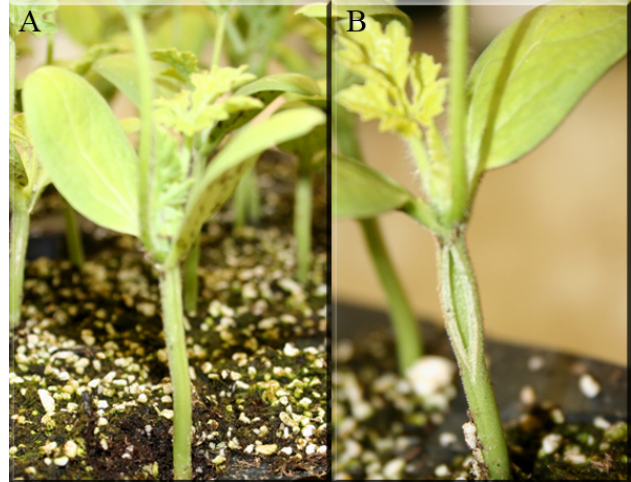
Although the cool weather may have contributed to the damping-off observed recently, the greenhouse mix must have been contaminated with one of the fungi listed above. Contamination may result from unclean tools or surfaces associated with the seedling process. Used transplant trays may become contaminated as well. Although it is possible to clean and disinfect such trays, it is difficult to do so completely.

Previcur Flex is labeled for greenhouse use on tomato, leaf lettuce, cucurbits and pepper seedling as a

preventative from damping-off caused by *Pythium* spp. Follow the label closely. <<http://www.ces.purdue.edu/extmedia/BP/BP-61/BP-61.html>>.



**STEM SPLITTING IN WATERMELON - (Chris Gunter)** - This week I was given a tray of watermelon seedlings that have a significant amount of stem splitting (Figure 1).



**Figure 1:** A) Normal watermelon stem, B) watermelon stem showing stem splitting. (Photo by Chris Gunter)

These seedlings were in the greenhouse during the recent round of freezing temperatures. During that time there was little or no growth of these transplants. Cell expansion in the stem stopped and cell walls began to harden. When favorable growing conditions returned, cells began expanding again and the pressure of cell expansion in the stem likely caused this cracking. Some cultivars may show this symptom worse than others. This problem has also been associated with high humidity and moisture in the greenhouse. Splitting may be seen when wet-dry cycles are frequent in the growing media. Water evenly and maintain good soil moisture. Also maintain good air circulation to help alleviate this problem.



**WHAT'S HAPPENING TO OUR BEES?!?! - (Greg Hunt)**

- Listening to the news, it seems like it's getting hard to keep bees alive these days. Last year it happened again, but now there's a new name for it: colony collapse disorder (CCD). Every three to five years it seems we have large die-offs of beehives across fairly large regions, at least since the parasitic tracheal mites and Varroa mites entered the U.S., which happened in the mid 1980's. Tracheal mites are not as bad now that most of our bees have pretty good resistance, but Varroa mites are still the major problem. Varroa transmit viruses and make the brood diseases worse, leading to colony population collapses that beekeepers call parasitic mite syndrome, or PMS, which usually is manifested as diseased brood in the hive, adults with virus, and inability to rear healthy brood. This past year beekeepers and researchers reported something they first called "fall dwindling" but are now calling "CCD". This syndrome does seem

unusual. CCD is different from typical PMS because the bees fly out and fail to return to the hives, leaving only a few young bees and apparently healthy brood. This might mean that whatever is hitting the bees is killing them quickly and that different pathogens or stresses are involved than what we usually see. But symptoms like this have been observed before, even before the mites arrived. They used to talk about the "disappearing disease", which meant the colony just dwindles, with very few or no dead bees lying around the hive. No one has ever figured out the cause. Jim Tew has an excellent article about this on the web: <[www.orsba.org/htdocs/download/Dtew.htm](http://www.orsba.org/htdocs/download/Dtew.htm)>

Among the things that could cause bees not to return to the hive are Nosema disease, which causes dysentery, or tracheal mites, or viruses. In fact, when your bees get typical parasitic mite syndrome and show diseased brood, the colony often dwindles without many dead bees in the hive, although you often see bees crawling around with deformed wings (probably caused by deformed-wing virus). Where did all the other bees go? Last year, it seems there was rapid dwindling of beehives in fairly large areas. The press release originating from Penn State has gotten a lot of play. The preliminary analyses of samples showed a significant amount of Varroa in hives that had dwindled, suggesting that maybe mites were a factor. They also saw various confusing symptoms in the dead bees. There is definitely something going on, but it may not be something new. Nosema, or dysentery disease is caused by *Nosema apis* (a spore-forming protozoan). In Europe they recently found *Nosema ceranae* associated with dying hives. Like Varroa mites, *N. ceranae* came from the Asian honey bee, *Apis cerana*. It is controversial whether *N. ceranae* is the cause of those colony deaths in Europe. I recently talked to a virologist (Judy Chen) at the USDA bee lab in Beltsville and she had checked for *N. ceranae* in the U.S. and said that it was common. Tom Webster at KSU also found *N. ceranae* in samples said to have CCD. We don't know how long this pathogen has been in the U.S. because nobody tested for it before! Maybe *N. ceranae* is a factor in CCD. Nobody knows. Nosema is considered a minor pathogen of bees but, fall application of Fumagillin (Fumadil-B) in sugar syrup will protect your bees from both kinds of Nosema that could weaken your hives.

In 2006, CCD was primarily a problem of migratory beekeepers. Moving bees causes them to be stressed, especially when they do not have good food sources. Devon Howald from Huntington, along with Dave Shenefield of LaFountaine took about 1500 hives from IN to CA and some of them dwindled while waiting for the almonds to bloom. But the ones that had access to good nectar were OK. They hope to at least break even after spending a lot of money in freight costs. Four out of five migratory beekeepers they spoke to in CA were seeing dwindling hives. The press release that generated this "buzz" included data from a survey by Bee Alert Technologies, which showed CCD was a problem in 25 states on a map. However, some of the states on

that map did not report widespread symptoms of CCD. They originally said IN was affected, but have updated the map. See <http://cyberbee.net/ccd.html>, for Zachary Huang's CCD page.

The problem we had in Indiana this winter was no fall nectar flow and those who did not have time to feed their bees lots of sugar syrup early enough in the fall had colonies that starved. And it seems that the colonies had virtually no pollen in the combs, which is an important source of protein for the bees during the winter. Clover Blossum Honey Company in LaFountaine may have 50% losses in many areas due to starvation. They can split their hives and make this up, but that is a lot of work. I am guilty of allowing starvation to take half of our Purdue hives. Leaving your supers on until September helps when there is a poor fall flow because it allows your bees to draw some of the honey from the supers down into the brood nest, but if there is no nectar flow in the fall they may still need syrup. My opinion is that there is no reason for beekeepers to worry about mysterious ailments. Hopefully, researchers will be able to provide answers. We beekeepers should monitor our hives for Varroa mites and control them when they get too high, preferably with "soft" chemicals, and we need to try to find bees that can tolerate the mites (see <[www.entm.purdue.edu/entomology/research/bee/index.htm](http://www.entm.purdue.edu/entomology/research/bee/index.htm)>, E201, Parasitic Mites of Honey Bees). In the fall and early spring, we should check our bees and feed if necessary. If we do these things, our bees will be OK. If you move your bees around for pollination, you will have to be careful with their nutrition and you may have to take losses sometimes. Hobby beekeepers are responsible for a large proportion of the pollination services of honey bees and an important part of agriculture.



**VALUE ADDED PRODUCER GRANT - (Announcement)**  
- USDA Rural Development is offering more than \$19 million nationally in competitive grant funds, to help independent agricultural producers enter into value-added activities.

Robert White, USDA Rural Development Indiana State Director said, "These Rural Development funds are a part of our strategy to help support small businesses and value-added products."

Under this year's program, the amount that can be awarded to a producer in the form of a working capital grant is \$300,000. The maximum amount for planning grants is \$100,000.

The grants may be used for planning activities, such as feasibility studies, marketing and business plans needed to establish a viable value-added marketing opportunity for an agricultural product, or to provide working capital for operating a value-added business venture, marketing value-added agricultural products and for farm-based renewable energy projects. Eligible applicants are independent producers, farmer and rancher cooperatives, agricultural producer groups, and majority-controlled producer-based business ventures.

Awards will be made on a competitive basis. Applications must be received no later than May 16, 2007. Detailed information and program requirements were included in the April 16, 2007 publication of the Federal Register <<http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/pdf/E7-7110.pdf>>.



**IVY TECH COMMUNITY COLLEGE AGRICULTURE PROGRAM** - (*Carolyn Hegel*) - It is a very exciting time to be involved in the agriculture industry. Beginning with the fall semester, the Kokomo Region of Ivy Tech Community College will be offering Crop Production Specialty classes. Besides classroom time, the students will have the opportunity to serve as interns on area modern commercial farms and participate in the fall harvest firsthand.

This new program gives students the opportunity of living at home and continuing their farming operation while studying for a degree. A two-year associate degree is offered, as well as classes that will transfer to Purdue University for a degree from their College of Agriculture. Upon completion of either course of study, the student will have skills to use in production agriculture or in many phases of agribusiness.

The cost for the program has not yet been published for fall, but should be approximately \$300 per class, plus books and fees (technology and lab).

To receive more information, please contact: Rhonda K. Groves, Technology Division Chair, (800) 459-0561 ext. 545, [rgroves@ivytech.edu](mailto:rgroves@ivytech.edu).



**NEW EXTENSION PUBLICATIONS - (*Announcement*)**  
- Food Entrepreneurship

Title	Item Number
Starting a Farmers' Market	EC-739
Food Safety Regulations for Farmers' Markets	EC-740
Using the WIC Program: A Guide for Farmers' Market Masters, Vendors, and Roadside Stands	EC-741
Food Entrepreneurship Series: Organic Products	FS-14-W
Food Entrepreneurship: Food Preservation and Processing Techniques	FS-15-W
Food Entrepreneurship: Regulations for Indiana Food Processing	FS-16-W
Food Entrepreneurship: Using Approved Kitchens	FS-17-W

For more information contact 1-888-EXT-INFO (1-888-398-4636) or online <<http://www.ces.purdue.edu/extmedia/menu.htm>>.

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