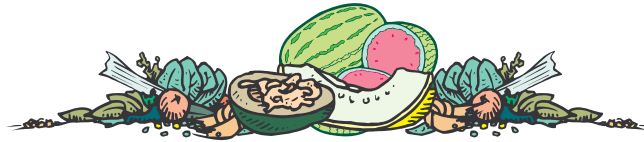


# VEGETABLE CROPS HOTLINE

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

Chris Gunter, Editor  
(812) 886-0198  
gunter@hort.purdue.edu



No. 432  
April 30, 2004

<http://www.entm.purdue.edu/entomology/ext/targets/newslett.htm>

## IN THIS ISSUE

- PREDICTED PEAK EMERGENCE AND AVOIDED PLANTING DAYS FOR SEEDCORN AND CABBAGE MAGGOTS IN 2004
- WINTER TEMPERATURES (2003-2004) AND SURVIVAL OF OVERWINTERING INSECTS IN INDIANA
- HAYGROVE TUNNELS
- NEW AGRICULTURE NEWSLETTER SERVES ORGANIC AND TRANSITIONING FARMERS
- PRODUCE INDUSTRY TRADE SHOW MAY 2-4
- DIRECT MARKETERS: ARE YOU LISTED ON THE WEB?
- GREENHOUSE AIR QUALITY
- 10 USEFUL RULES FOR FUNGICIDE APPLICATION

### PREDICTED PEAK EMERGENCE AND AVOIDED PLANTING DAYS FOR SEEDCORN AND CABBAGE MAGGOTS IN 2004

- (Frankie Lam) - A shortened article was written as a *Vegetable Crops Hotline-BULLETIN* on April 13 and April 19, 2004. The full version follows. Seedcorn maggot and cabbage maggot are two species of flies belonging to the same family. The damaging stage of both species is the larval or maggot stage. The maggots feed on the root and tunnel into the roots and crown. Plants attacked by the maggots may wilt and show stunted growth, and eventually die. The feeding sites of the maggot may cause secondary infection by plant pathogens. Both species have more than one generation per year in the Midwest, but the first-generation is the most damaging population.

The maggots of the two species look relatively alike and it is not easy to identify them based on the external features. Seedcorn maggots usually prefer corn, beans, and cucurbits; however, cabbage maggots usually attack cole crops. To a lesser extent, germinating seeds and seedlings of cole crops may also be attacked by seedcorn maggots. Furthermore, heavy soil with plenty decaying organic matter is more attractive to the seedcorn maggot, whereas light and sandy soil is more susceptible to cabbage maggot infestation.

One of the tactics to prevent heavy infestation of maggots during the early-season is to avoid planting the crop in the wet, cool spring and within the peak of adult emergence and egg-laying period. Wet and cool weather usually favors the development of both seedcorn and cabbage maggots. A study indicated that once the soil temperature reaches 70°F at the 4-inch depth there is seldom an outbreak of seedcorn maggots. During spring the peak emergence of adult flies and egg-laying period can be predicted by accumulating the degree-days. Degree-days are calculated by using the daily mean temperature minus the developmental threshold, and then accumulating the positive values from April 1. The developmental threshold for seedcorn maggot is 39°F, whereas for cabbage maggot is 43°F. The total degree-day for the first-generation seedcorn maggot adult emergence is 200, while for cabbage maggot is 300.

The predicted peak emergence and avoided planting days for seedcorn and cabbage maggots at six Purdue Agricultural Centers in 2004 are presented in Table 1. The predicted peak emergence was calculated

**Table 1. Predicted peak emergence and avoided planting days for seedcorn and cabbage maggots at six Purdue Agricultural Research Centers in 2004.**

Research Center (District)	Seedcorn maggot		Cabbage maggot	
	Predicted peak emergence	Avoided planting days	Predicted Peak emergence	Avoided planting days
Wanatah (NW)	4/20	4/14 to 4/27	5/4	4/28 to 5/11
Columbia City (NE)	4/19	4/13 to 4/26	5/1	4/25 to 5/8
Lafayette (WC)	4/18	4/12 to 4/25	4/28	4/22 to 5/5
Farmland (EC)	4/19	4/13 to 4/26	5/1	4/25 to 5/8
Vincennes (SW)	4/16	4/10 to 4/23	4/24	4/18 to 5/1
Butler (SE)	4/18	4/12 to 4/25	4/26	4/20 to 5/3

by using the temperatures measured at the Centers (from April 1 to 26) and the climate normals of the districts (from April 26 to the predicted peak emergence). To avoid heavy infestation, the crop should be transplanted at least 1 week before or after the predicted peak emergence. Depending on the districts, the predicted planting days to avoid heavy infestation for seedcorn maggot are from mid to late April and for cabbage maggot are from the last week to the first week of May.

The following are the preventive tactics to avoid heavy infestation of maggots during early-season:

- Plowing down cover crops at least 3 to 4 weeks before planting.
- Avoid planting in the cool, wet spring.
- Plant the crop when soil temperatures at the 4-inch depth exceed 70°F.
- Check with the weather forecast and predict the peak of adult fly emergence. If the weather is warm, transplant the crop at least 1 week before or after the predicted peak of adult emergence.



**WINTER TEMPERATURES (2003-2004) AND SURVIVAL OF OVERWINTERING INSECTS IN INDIANA - (Frankie Lam and Ken Scheeringa) -** Winter temperature has a strong impact on the survival of overwintering insects.

Colonizing insect populations are closely related to the survival of overwintering population, which depends greatly on the weather of the past winter. In fact, research has demonstrated that numbers of insect pests on some crops later in the growing season are largely determined by the size of the colonizing populations during early spring.

Winter temperatures affect the survival of overwintering insect populations in two ways: how cold the temperature was and how long the insects had to endure that particular cold temperature. Except for a few species, we do not have models to predict the percentage of winter survival for most insects. A study at Iowa State University on the winter survival of bean leaf beetle led to the development of a model to predict the percentage of winter mortality by accumulating the daily mean subfreezing temperatures (< 32°F) through the winter. The model demonstrated that the colder the winter temperature, the lower the percentage of overwintering beetles that survived through winter. Furthermore, the results of predicting the beetle population trends and fluctuations by the model were relatively accurate during the past few seasons in Iowa.

Following the logic of the study in Iowa we can understand relatively how cold the past winter was and how great its impact on the overwintering insect populations. The **accumulated freezing degree-days** (Table 1) were obtained by subtracting the daily mean air temperature (°F) from 32, rejecting the days with negative results, and then accumulating the remaining positive daily values through winter. For example, if the daily mean air temperature is 31°F, thus, 32 minus 31 this will be one degree-day. The **days below freezing** is the total number of days with daily mean air temperature below 32°F, that is, when freezing degree-days occurred, through winter. In this article the climate normals (Table 2) are used as “standards” to compare with those data from the past winter. A climate normal is simply the arithmetic average of the observed daily values over the international standard 30-year period, currently 1971-2000 (three consecutive decades). By comparing the cumulative freezing degree-days of the past winter (2003-2004) with the climate normals (1971-

**Table 1. Accumulated freezing degree days and days below freezing of the nine Indiana agricultural statistics districts during winters 2003-2004**

District	Climate Normals (2003-2004)							Days below Freezing
	Accumulated Freezing Degree Days (°F)							
	Nov	Dec	Jan	Feb	Mar	Total		
NW	8	89	372	185	12	666	71	
NC	7	85	392	193	21	698	74	
NE	7	85	407	195	26	720	77	
WC	4	74	310	141	7	536	61	
C	4	70	312	127	9	522	65	
EC	5	73	338	135	14	565	70	
SW	0	30	179	50	0	259	40	
SC	0	34	194	51	0	279	48	
SE	0	38	225	57	3	323	52	

2000), the past winter in the nine districts was colder than that of a normal year in Indiana. However, if we compare the days below freezing this past winter to the climate normals, only the days in the southern districts were greater than normal in the past winter. In addition, if we compare the cumulative freezing degree days and days below freezing between the past two winters, temperatures on average in the past winter (Table 1) were not as cold as that of the winter 2002-2003 (Table 3).

Based on these weather data, we might surmise that if the insect pests have a certain stage that overwinters in Indiana, the over-wintered populations in early

spring would be relatively smaller than that of a normal year, but the numbers would not be as low as that of last spring. On the other hand, if the insect pest has more than one generation per year in Indiana other than the over-wintered population, it is difficult to predict the relative numbers of the subsequent generations with this hypothesis. This is because the size of subsequent populations will also be greatly affected by the weather in the coming spring and early summer. Moreover, if the weather in the early season is favorable for their growth, those insect populations in the mid or late season still have the probability of reaching the economic thresholds.

**Table 2. Accumulated freezing degree days and days below freezing of the nine Indiana agricultural statistics districts during winters 1971-2000 (climate normals).**

District	Climate Normals (1971-2000)							Days below Freezing
	Accumulated Freezing Degree Days (°F)							
	Nov	Dec	Jan	Feb	Mar	Total		
NW	0	112	270	118	0	500	82	
NC	0	97	255	114	0	466	80	
NE	0	99	259	129	0	487	83	
WC	0	57	191	51	0	299	66	
C	0	49	177	52	0	278	66	
EC	0	62	202	74	0	338	71	
SW	0	2	52	0	0	54	33	
SC	0	5	57	2	0	64	38	
SE	0	3	54	2	0	59	36	

**Table 3. Accumulated freezing degree days and days below freezing of the nine Indiana agricultural statistics districts in winter 2002-2003.**

District	Winter 2002-2003							Days below Freezing
	Accumulated Freezing Degree Days (°F)							
	Nov	Dec	Jan	Feb	Mar	Total		
NW	22	132	427	253	79	913	89	
NC	21	143	422	262	86	933	91	
NE	20	154	411	273	98	956	93	
WC	14	98	391	226	49	778	84	
C	13	93	375	229	51	761	80	
EC	17	113	398	258	60	845	84	
SW	1	60	217	116	13	407	56	
SC	4	58	233	117	14	426	62	
SE	6	59	267	139	23	494	68	

**HAYGROVE TUNNELS – British Tunnel Tour, July 2004 –** Early last October, Haygrove Tunnels hosted 15 American growers on a weeklong tour of tunnel production in England. The group visited several farms, met with the growers and learned how Haygrove tunnels can increase the grower's bottom line. Several of England's most famous tourists attractions were included in the tour. Because of the overwhelmingly positive response to this initial effort, Haygrove announces the second annual North American grower tour of England.

This year's tour will feature Haygrove's home farm with 2220 acres of strawberries, raspberries, cherries and lilies produced under tunnels. The latest developments in Haygrove's multi-bay tunnels, mechanization, season extension and Visqueen's spectral filter hort films will be showcased. A half day visit to Fruit Focus, Britain's premier small fruit trade show, will also be included.

The July 24-31<sup>st</sup> tour will visit other growers using Haygrove tunnels, including Hilliers Nursery, Intercrop Farms (leading salad/vegetable producer), Edward Vinson Plants Ltd. (plant breeder/small fruit grower) and Hurst Farm (direct marketer/table top strawberry producer). Additional visits will include the city of Oxford, Windsor Castle (home of Queen Elizabeth II), Canterbury Cathedral, Chartwell House (Winston Churchill's home) and an open day to visit London.

The tour will depart from a selected hotel near Heathrow airport at 8:00 A.M. July 25 and return to the same hotel late July 30. The price of \$799 is based on double occupancy (\$1199 single) and includes 7 nights lodging, coach transportation in England and two dinners sponsored by Haygrove. Airfare is not included. Sign up deadline is May 15, 2004 and space is limited.

Join other progressive North American growers and meet UK growers experienced at producing acres of crops in Haygroves. Find out why Haygroves are a good investment in your future!

To join this informative, educational tour, call (866) HAY-GROVE.



**NEW AGRICULTURE NEWSLETTER SERVES ORGANIC AND TRANSITIONING FARMERS - (Liz Maynard)** - Three universities, Michigan State University, Purdue University, and the University of Illinois, are joining resources to bring seasonal advice to field crop and vegetable growers interested in organic agriculture. Nine organic growers will share crop updates and advice with Extension personnel to generate information at this new web site. University specialists will also write articles about a variety of practices and new findings useful for organic growers. This site will serve those interested in transitioning to organic as well as those currently practicing low-input organic agriculture.

The first issue of the New Agriculture Network has been posted at: <[www.ipm.msu.edu/new-ag.htm](http://www.ipm.msu.edu/new-ag.htm)>.

To receive e-mail announcements when future issues are posted, go the Web site above and follow instructions under the "Get notification..." link.

Indiana producers without internet access who would like to receive the newsletter may call (219) 785-5673 to request alternate delivery.



**PRODUCE INDUSTRY TRADE SHOW MAY 2-4 - (Liz Maynard)** - Chicago will be overflowing with the latest in produce marketing trends on May 2-4 at the United Produce Expo and Conference. And that's not all. The All Things Organic Trade Show, the Fancy Food Show, the US Food Export Showcase, and the Food Marketing Institute Show will all be held at the same location and time. It is a great opportunity to have these shows nearby this year. I hope some of you will be able to attend!

See the following Web sites for more information, or call UFFVA at: (202) 303-3400

- Produce Show <[www.uffva.org/produceshow/](http://www.uffva.org/produceshow/)>
- All Things Organic Trade Show <[www.atoexpo.com/](http://www.atoexpo.com/)>
- Food Marketing Institute <[www.fmi.org](http://www.fmi.org)>
- Fancy Food Shows <[www.specialtyfood.com/do/fancyFoodShow/LocationsAndDates](http://www.specialtyfood.com/do/fancyFoodShow/LocationsAndDates)>
- US Food Export Showcase <[www.nasda.org/nasda/nasda/Usfes/index.html](http://www.nasda.org/nasda/nasda/Usfes/index.html)>



**DIRECT MARKETERS: ARE YOU LISTED ON THE WEB? -**

*(Liz Maynard)* - More and more people are using the internet to locate businesses and find out about places they plan to visit. Will potential customers looking on the internet be able to find you? There are several web sites that will list your operation or community farmers market, in some cases at no cost to you. Whether your farm has its own website or not, consider getting listed on one or more of the sites below. Also, don't forget to check with your local chamber of commerce and/or visitor's bureau to see about getting listed on their web site. If you don't have internet access or need assistance signing up for the sites below, please contact me at (219) 785-5673.

- <[www.in.gov/oca/other/markets.html](http://www.in.gov/oca/other/markets.html)> - Indiana Office of the Commissioner of Agriculture. Download a form, fill it out, and fax back to be included in this listing. No charge.
- <[www.localharvest.org](http://www.localharvest.org)> - Free listings for direct marketing family farmers and for farmers' markets in a nationwide electronic directory. (Only 53 Indiana farms are listed on this site, as well as 64 Indiana farmers' markets. I'm sure we have more farms that are direct-marketing than that!)

- <[www.indianafarmdirect.com](http://www.indianafarmdirect.com)> - Members are provided with listings on the site. Send e-mail to [truitcomm@agriamericamail.com](mailto:truitcomm@agriamericamail.com) to request an application for membership.



**GREENHOUSE AIR QUALITY** - (*Chris Gunter*) - As the season starts and growers begin to use greenhouses that have been empty for the winter; we are starting to see a few cases of injury due to poor air quality. One problem causing gas of concern to most greenhouse growers is ethylene. This gas can be generated by faulty heat exchangers, dirty fuel openings, and incomplete combustion of fuel. We have also seen problems caused by using unvented unit heaters in the greenhouse. These problems can be increased in especially tight greenhouse structures, those that have little exchange with the outside air.

Ethylene is a plant hormone produced by plants during their growth and development. However, ethylene produced through faulty heating equipment can be very detrimental to greenhouse crops, because it is produced in high concentrations. It can affect all the above ground parts of the plant including leaves, flowers and fruit. Low levels of ethylene can cause leaves to droop downward, epinasty, even though they are not wilted. Stem thickening, increased branching, flower bud abortion, flower malformation and general stunting can also occur as a result of exposure to ethylene. This year we have seen ethylene damage on several crops growing in different greenhouses including watermelon, cantaloupe, squash, and tomatoes, which are especially sensitive to ethylene. A wide range of crop plants can be affected by ethylene in the greenhouse.

Symptoms of ethylene damage can be very subtle, especially if there are no plants grown in clean air available for comparison. Further complicating diagnosis are factors like exposure time, concentration of ethylene, stage of plant development, temperature and sensitivity of plant species to damage by the gas.

Proper heating system installation and maintenance are the best ways to prevent problems. A maintenance plan should include cleaning the unit heater and fuel orifice twice a year. Propane flames should have a small yellow tip when properly adjusted and natural gas flames should be a soft blue with a well defined inner cone. To ensure proper combustion heater units should have a clean air intake, which provides fresh air to the combustion chamber. Adjustment and maintenance of heating units are best done by professionals before the greenhouse is started for the growing season. When having the heater serviced, always ask the repairperson to check for leaks, cracks and any obstructions that may be in the stack (Figure 1). Also all heaters used in the greenhouse should be vented to the outside with a stack, which allows for exhaust gas not to be drawn back in to the greenhouse through the ventilation system.

For more information on greenhouse air quality check out the Purdue University Floriculture Extension website at <[flowers.hort.purdue.edu/web/GHguides.htm](http://flowers.hort.purdue.edu/web/GHguides.htm)>.



Figure 1: A) This bird's nest was pulled from the stack of a greenhouse; B) from this close-up it's clear this is an active nest from this season. (Pictures by C. Gunter)



**10 USEFUL RULES FOR FUNGICIDE APPLICATION** - (*Dan Egel*) - Below I have listed 10 rules that will help vegetable growers apply fungicides effectively and safely. Rules 1 through 7 are listed in no particular order; however, I saved the most important three for last.

- 1. Apply fungicides prior to the development of disease.** Most fungicides do not have a "kick back" action. That is, they do not effectively eradicate diseases after they have started. And by the time a single disease lesion is observed in the field, many more lesions too small to observe are already working at your crop.
- 2. Use shorter spray intervals during weather conducive to plant disease.** Each plant disease has its own "personality" and thus prefers different weather. However, most plant diseases require leaf wetness. Therefore, during periods of rain and heavy dews, more frequent fungicide applications are a good idea. The normal range of spray applications is every 7 to 14 days. Muskmelon and watermelon growers have the guesswork taken out

of this process with a Purdue University program known as MELCAST. Ask the author for more details by calling (812) 886-0198.

3. **Apply fungicides before a rain if possible.** Water is necessary for most fungal spores to infect a leaf or stem and for the splash dispersal of many spores. Therefore apply fungicides before a rain if it appears that the fungicide will have a chance to dry before the rain. It is not necessary to apply fungicides again after every rain. Most modern fungicides have a good sticker and will persist through rains pretty well.
4. **Avoid applying fungicides in the heat of the day.** It is possible for any foliar applied chemical to cause some plant damage if applied under conditions of heat and direct sunshine. Also remember that if fungicides and insecticides are applied together, make the applications so that bees are unharmed.
5. **Timing of fungicide applications is more important than nozzle type and spray pressure.** Studies here in southern Indiana as well as by researchers in other areas of the country have found that nozzle type and spray pressure doesn't make as much difference as we once thought. See the *Vegetable Crops Hotline* issue #430 for details.
6. **Some diseases cannot be managed by foliar sprays.** Problems caused by soil borne fungi or nematodes cannot be controlled with foliar fungicides. Examples of these types of problems would be Fusarium wilt of watermelon or root-knot

nematodes of tomatoes. Also, be certain that the problem you observe is really a disease. No amount of fungicide will improve a problem caused by soil fertility.

7. **Do not apply foliar fungicides to the soil.** Although fungicides may kill or inhibit the growth of fungi which cause plant diseases, the application of those same fungicides to the soil will be wasteful and off label. Foliar fungicides are designed to protect the surfaces of plants.
8. **Make certain the fungicide matches the crop and disease.** That is, READ THE LABEL. The label is the law. Plus, considerable time and money was spent to test each fungicide with a particular crop and disease. Off label applications also waste your time and money.
9. **Double-check the label for the current rate per acre.** Rates may vary widely based on label changes and different formulations. While you are checking the rate, also check to make sure your application method is labeled. (Can this fungicide be applied in the greenhouse?) Did you get the rate from the *Midwest Vegetable Production Guide for Commercial Growers* <[www.entm.purdue.edu/entomology/ext/targets/ID/index.htm](http://www.entm.purdue.edu/entomology/ext/targets/ID/index.htm)>? Check the label anyway.
10. **Play it safe.** Always adhere to the Post-Harvest Intervals, Re-Entry Intervals and Worker Protection Standards listed in the label. No one wants an accident or lawsuit. Besides, the label is the law.

It is the policy of the Purdue University Cooperative Extension Service, David C. Petritz, Director, that all persons shall have equal opportunity and access to the programs and facilities without regard to race, color, sex, religion, national origin, age, marital status, parental status, sexual orientation, or disability. Purdue University is an Affirmative Action employer. 1-888-EXT-INFO <<http://www.ces.purdue.edu/marketing>> Disclaimer: Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may have similar uses. Any person using products listed in this publication assumes full responsibility for their use in accordance with current directions of the manufacturer.

Vegetable Crops Hotline  
c/o Chris Gunter  
Southwest Purdue Agricultural Program  
4369 N Purdue Rd  
Vincennes, IN 47591