VEGETABLE CROPS HOTLINE

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

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CUCURBIT SEEDLING DISEASES - *(Dan Egel)* - Several diseases and other disorders of watermelon and muskmelon transplants in the green-house can become quite serious. Managing such diseases depends primarily on keeping the greenhouse and transplant trays clean, avoiding contaminated seed or transplants and scouting the greenhouse for early recognition of a problem.

Gummy stem blight - The stems of infected seedlings are often dark brown and look water-soaked at the point where the seed leaves (cotyledons) are attached to the stem. Stems of such seedlings remain green at the soil line. Gummy stem blight may be brought into a greenhouse on contaminated transplants or seeds. This disease may also occur in a greenhouse that was not properly cleaned up from a previous occurrence of the disease.

Anthracnose - This disease causes sunken lesions to occur on the stem. Lesions on true leaves often have sharp or angular margins. Anthracnose may occur in a transplant facility in the same manner as gummy stem blight (See above).

Bacterial fruit blotch - The first symptom observed in this disease is likely to be a water-soaked lesion on the underside of the seed leaves. This lesion will quickly spread to the entire seed leaf and to the true leaf. On true leaves lesions are small, dark brown, and often surrounded by a band of yellow tissue. Bacterial fruit blotch, like gummy stem blight and anthracnose, may be brought into a trans-plant facility on transplants or seeds.

Damping-off - Seedlings affected with damping-off fungi look brown and water-soaked at the soil line. Such seedlings quickly wilt and collapse. The roots may appear brown. This type of disease may be caused by one of several soil fungi. These fungi are not seed borne and may survive in soil or plant debris on transplant trays or greenhouse floors.

Remember that diseases such as gummy stem blight, anthracnose and bacterial fruit blotch will occur in one or a few clusters in the greenhouse. Damping off will likely occur on trays that are less well drained. Problems that occur on most of the seedlings in the greenhouse or along a wall or walk way are likely due to environmental conditions such as cold or wind.

Growers who have confirmed serious seed borne problems in their transplants face a decision about whether to set such seedlings in the field or not. Growers who choose to plant such seedlings should remove all trays with infected seedlings and all the surrounding trays. The remain-ing seedlings may be sprayed with an appropriate fungicide or bactericide. Be certain to check the label for proper rates and usage.

If apparently healthy seedlings from a greenhouse with gummy stem blight are set in the field, do not wait until vine touch to spray the plants. For the first 20-30 days in the field, spray every 7-10 days with a mancozeb (e.g., Dithane, Manzate, Penncozeb), chlorothalonil (e.g., Bravo, Equus, Echo) or a stoblurin (e.g., Quadris) product. If after 20-30 days the plants look healthy, use the MELCAST system of spraying. For bacterial problems use copper hydroxide applications, perhaps in combination with a mancozeb product.

Watermelon and muskmelon diseases are well described in the Purdue CES publication Diseases and Pests of Muskmelon and Watermelon (BP-44). It is available through the Media Distribution Center by calling 1-888-EXT-INFO.

LEGGY TRANSPLANTS - *(Dan Egel & Liz Maynard)* - Transplants that are too tall and tend to fall over are often referred to as spindly, shanky or leggy. Such transplants may have low survival rates in the field. Several factors may cause leggy transplants. Those producers who grow seedless watermelon should pay careful attention to germination conditions. In the past, I have emphasized the importance of keeping the seeds 85 to 95°F for at least 48 hours. If the seeds are kept warm past the point where the seeds have germinated, the

additional warmth may lead to an increase in seedling height.

Spindly transplants may also be produced under low light conditions. Greenhouse structures that let inadequate light in and cloudy weather could be the culprits. Over watering may lead to spindly plants. Avoid watering or fertilizing seedlings during cloudy weather.

Temperature may also cause transplants to be elongated. Hot days and cold nights favor leggy transplants. If night temperatures are equal to or higher than day temperatures, stem elongation will be reduced. It may be sufficient to lower the greenhouse temperatures for a two-hour period starting at dawn.

Over fertilization can also lead to spindly transplants. In particular, high levels of phosphorus may cause taller plants. If high P might be a problem, experiment with a fertilizer containing a lower percentage of phosphorus, for instance, try 21-5-20 rather than 20-20-20. It is important to provide adequate P, but not too much; under fertilization with P will produce short plants, but yields will also suffer.

Label Changes for Warrior - *(Rick Foster)* - Syngenta has announced that Warrior insecticide is now labeled for a wide variety of pests on beans (dry and succulent), peas (dry and succulent), peppers (bell and non-bell) and eggplant. Be sure to consult the label for more detailed information.

Applying Fungicides Effectively - *(Dan Egel)* - Before growers begin applying fungicides to vegetables, here are some items to consider.

Nozzle types and spray pressures - Ask folks connected with applying fungicides to vegetables and you will probably hear that the most effective applications are done with hollow cone nozzles and high spray pressures. Although little work has been done with vegetables, the work that has been done does not support this conclusion. Research conducted at the Southwest Purdue Agricultural Program, over a 3-year period, demonstrated no differences in flat fan versus hollow cone nozzles and spray pressures ranging from 30 to 150 pounds per square inch (PSI). For this work, cholorothalonil (Bravo Ultrex) was applied to muskmelon plants inoculated with Alternaria leaf blight. Similar results have been obtained with other vegetable crops. Disease control was the same for hollow cone and flat fan nozzles for early and late leaf spot of peanut, bacterial spot of peppers, and blast and purple blotch of onions. In addition, spray pressures ranging from 50 to 250 PSI did not affect control of early leaf spot or late leaf spot of peanut.

One study found that while hollow cone tips provide better overall coverage, flat fan tips provide better penetration into the plant canopy. However, our work at the Southwest Purdue Ag Program with water-sensitive paper did not detect differences in coverage between flat-fan and hollow cone nozzles over spray pressures of 30, 60 and 120 PSI.

Fungicide application timing - The first rule of fungicide application is to apply fungicides before a disease shows up. This is true because by the time one disease lesion is observed, dozens of lesions too small to be seen with the naked eye are already present. Remedial treatments applied after a disease is diagnosed are seldom very effective, regardless of the fungicide. A general rule is to begin fungicide applications before vines touch within a row.

After the initial application, most growers apply fungicides at intervals ranging from 7 days to 14 days. Shorter intervals should be used when disease pressure is high, longer intervals when disease pressure is low.

Disease pressure is highly dependent on the weather. Anthracnose and gummy stem blight prefer warm, moist conditions. Under such conditions, spray intervals should be shortened.

The manner in which fungicides are applied may not be as important as when and how often they are applied. Apply fungicides before disease is observed and make more frequent applications during warm, moist weather. The time and effort directed at proper disease control will pay handsome dividends at harvest.

Cabbage Looper in Southwest Indiana - *(Frankie Lam)* - Four cabbage loopers were collected by the blacklight trap at Southwest Purdue Agricultural Center in Knox county last week. The cabbage looper overwinters as a pupa in the southern states, but not in the Midwest. Each year the adults migrate to Indiana in June. This year the adults seem to have arrived earlier than normal.

Figure 1. Cabbage looper adult (Picture by C. Eastman)

The adult cabbage looper is a mottled, grayish-brown moth with a wing span about 1 1/2 inches in length. On each front wing it has a small silvery-white figure eight in the center and two blackish-grey zigzag stripes on the edge (Figure 1). The hind wing is pale brown with a dark margin. The moth is a nocturnal flier and feeds on nectar of flowering plants, including clover, goldenrod, dogbane, and sunflowers. The pest has two generations in Indiana and the second-generation that occurs in August and September is the most damaging population.

The dome-shaped, greenish-white, ridged eggs are normally laid singly or in small numbers on the underside of the lowest leaves. The eggs are approximately the size of a pinhead. The larvae hatch from the eggs a few days after being laid. The first instars are initially dusky white, hairy, and have a black

Figure 2. Cabbage looper larva (Picture by S. Mahr)

capsule. After the first molt the larvae become pale green, have a green capsule and the number of hairs decrease rapidly as the larvae mature (Figure 2). The mature larvae are usually marked with a distinct white stripe on each side of the body and approximately 1 1/2 inches in length. The larvae have three pairs of "true" legs behind the head and three pairs of "false" legs (prolegs) on the 3rd, 4th, and 6th segments of the body. The larvae get their name from the way they move with their body humped or "looped". The insect pupates in a delicate cocoon wrapped with white threads on the underside of lower leaves. It takes 4-6 weeks for the insect to complete its life cycle, depending on the temperatures.

The cabbage looper feeds on a wide variety of cultivated plants and weeds. Their crop hosts include broccoli, cabbage, cauliflower, Chinese cabbage, collards, mustard, radish, turnip, beet, celery, cucumber, lima bean, lettuce, pea, potato, spinach, squash, tomato, cotton and tobacco. The suitable weed hosts are lambsquarters, wild lettuce, dandelion and

Figure 3. Cabbage looper damage on cabbage (Picture by S. Mahr)

curly dock. Although occasionally seedlings are damaged, most crop injury occurs after heading. Young larvae usually feed between the veins on the underside of the lower leaves, whereas large larvae make ragged holes in the foliage, bore into the head of the plant and contaminate heads with fecal material or frass (Figure 3). Plants can be severely defoliated and stunted, producing no heads or heads that are unmarketable.

Table 1. Economic Thresholds for Cabbage Looper

Stage Infested	Economic Threshold
Broccoli and Cauliflower	
Seedbed	10% plants infested
Transplant to first flower or curd	50% plants infested
First flower or curd to maturity	10% plants infested
Cabbage	
Seedbed	10% plants infested
Transplant to cupping	30% plants infested
Cupping to early head	20% plants infested
Mature head	10% plants infested
Celery	
More than 4 weeks before harvest	2 larvae per 100 plants
Less than 4 weeks before harvest	Preventivelky treated, approximately weekly
Green peas	
21-10 days before harvest	1 in 25 sweeps
Leaf crops	
All stages	5% plants infested
Tomatoes	
Immature plant	>20% defoliation
Mature plant	>25% defoliation

Cabbage looper has many natural enemy, which may suppress their number below damaging levels, or they may be killed by insecticide treatments aimed at controlling other pests. These natural enemies include parasitic wasps and flies, a viral disease, spiders and birds. However, natural enemies usually provide control too late in the season to be effective for commercial production. When scouting for cabbage looper, check 25 to 50 plants selected randomly in a 20-acre field. The economic thresholds for some vegetables are listed in Table 1. Using biological insecticides is recommended for early-season control, *Bacillus thuringiensis* is effective against young stages of cabbage looper and has less adverse impact than conventional insecticides on natural enemy populations. Other insecticides applied for the control of cabbage looper are listed in the Midwest Vegetable Production Guide for Commercial Grower 2003 (ID-56) <www.entm.purdue.edu/entomology/ext/targets/ID/index.htm>. Follow label directions carefully before using any pesticides.

Dual Magnum on Tomatoes – *(Liz Maynard)* - Dual Magnum has received a national label for use on tomatoes. This product has had an emergency (Section 18) label for control of eastern black nightshade in processing tomatoes for the past few years, so many growers will have experience with it. For transplanted tomatoes it may be applied preplant incorporated or preplant without incorporation. It may also be applied as a post-directed spray after transplanting, or to row-middles in bedded tomatoes. To avoid injury to tomatoes be sure to follow label precautions. There is a 90-day preharvest interval, which may limit its use in some fresh market tomato varieties. A specimen label is available on-line from CMDS at <www.cdms.net/manuf/1prod.asp?pd=3253&lc=1>.

Field Day - *(Southwest Purdue Ag. Team)* - Mark your calendars early for the field day at the Southwest Purdue Agricultural Center North of Vincennes, IN. It is scheduled for August 7, 2003 from 1-4 pm. This field day is your chance to take a look at the research that is taking place here at the research farm. There will be tours of the research facility and the field experiments that are being conducted. This is also a great time to meet the team and ask questions about what we do here. The field day is open to the general public.

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