# VEGETABLE CROPS HOTLINE

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

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## *IN THIS ISSUE*



**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 add lead to an increase in seedling height.

Spindly transplants may also be produced under low light conditions. Greenhouse structures that let in inadequate light in or 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.

**ACTIVATED CARBON TO PROTECT AGAINST HERBICIDE INJURY** - (*John Masiunas*) - *This article is reprinted from Illinios Fruit and Vegetable news.* Activated carbon or activated charcoal can be used in some situations to bind herbicides. Activated carbon has a large surface area, which will attract organic molecules including many common herbicides. Where should activated carbon be used? Activated carbon should be used to absorb soil-applied herbicides in limited areas of high-value crops. It will not protect against injury due to drift. Generally in drift situations, herbicides are absorbed by the leaves. Once the plant is injured or the herbicide is absorbed, activated carbon will provide no protection.

Activated carbon is difficult to apply to large areas and requires large amounts to deactivate herbicide residues. If large areas are effected, it is better to rework the area and plant a crop that tolerates the herbicide residues. Activated carbon can tie-up some soil nutrients along with soil-applied pesticides, thus influencing crop growth. It should not be used in place of following rotation restrictions. In vegetable production, activated carbon can be used when a herbicide persists longer than it normally would. In many cases, herbicide carry-over causes widely scattered death of plants. In those areas, herbicide residues may be higher than other areas due to overlapping during application, places where higher rates of a herbicide were applied and areas where soil type (i.e., sandier soil), pH or organic matter differ. Before using activated carbon, make sure the injury is caused by herbicide carry-over and not by poor quality seeds, soil insects, plant pathogens, or nematodes. These latter problems will not be corrected by activated carbon.

If you are going to replant seed or transplants into areas where the crop has died or been injured, then you can incorporate activated carbon into the small areas where you are replanting. Transplants can also be protected by dunking the roots into a surrey of activated carbon and water. The aim of both methods is to protect the roots until the herbicide degrades or the roots are able to grow through the area of high herbicide residues. Neither method will provide 100% protection against herbicide residues, but treatment with activated carbon is better than replanting with no protection.

**WEED CONTROL IN ESTABLISHED ASPARAGUS** - (*Liz Maynard*) - Asparagus growers have a number of weed control options, including herbicides, cultivation, and mulching. The herbicide options discussed in this article apply to established asparagus plantings, not newly planted crowns or seedlings.

Choice of herbicides should take into account which weeds dominate the field. To control annual grasses as they emerge, Treflan, Devrinol, Sinbar, or Solicam are possible options. These preemergence herbicides are applied in early spring after chopping the fern and tillage, and before the spears and weeds have emerged. Sometimes a second application is made after harvest is complete and before fern emerges. Solicam provides the longest residual activity, 3 to 4 months, and will help control ragweed and suppress nutsedge. Sinbar gives 2 to 3 months residual activity, and controls many broadleaves as well. Treflan provides 4 to 6 weeks of residual activity, and will also control small-seeded broadleaves like lambsquarters and purslane. The relatively short residual means that grasses emerging later in the season will require additional control.

Emerged grasses can be killed with Poast or Fusilade applied over the top of asparagus. If applied during the harvest period, spears may not be harvested for 1 day after the application.

To control annual broadleaves as they emerge, Karmex, Sencor or Lexone are possible options. These are applied in early spring, and if

necessary, after the harvest is finished. Karmex remains active for 6 to 8 weeks, and will also control foxtails and barnyardgrass. Sencor and Lexone also provide 6 to 8 weeks of residual control, but are not effective against grasses, or broadleaves in the nightshade family such as eastern black nightshade or jimsonweed.

Emerged broadleaves may be controlled with Formula 40 before or during harvest season, or after harvest is finished. If fern is present, drop nozzles should be used to avoid spraying the fern. Stinger may also be used to control broadleaf weeds, and is particularly effective against Canada thistle. If applied during harvest, 12 hours must pass after Stinger is applied before spears may be harvested. There is potential for spear malformation with both of these herbicides when they are used during the cutting season.

A mixed stand of broadleaf and grassy weeds may be killed with non-selective, non-residual, postemergence herbicides such as Gramoxone Extra and Roundup Ultra. These materials may be used before spears emerge, or after the harvest period has ended and before ferns emerge. These herbicides should not be applied over the top of the asparagus. Roundup Ultra may also be used as a spot treatment after fern has emerged, as long as no spray touches the fern. This is a good option for controlling patches of perennial weeds.

In new asparagus plantings (crowns), herbicides are limited to the non-selective postemergence materials and the grass postemergent materials.

Cultivation and if necessary, handweeding have a place in asparagus weed management. In fields where herbicides are not used, as well as in fields where herbicides do not provide sufficient control, weed populations should be kept to a minimum using these methods.

For specific instructions on use of herbicides mentioned in this article, refer to the product labels.

**Greenhouse Sanitation** - (*Dan Egel*) - Several growers have already called to ask questions about greenhouse sanitation. Below are my recommendations:

- Trays, pots, etc. should be cleaned well before use. Trays should be cleaned with water and then disinfected with a 10 minute soak in a 10 % bleach solution (0.5 % Sodium Hypochlorite) or 10 minutes in a quaternary ammonium solution such as Green-Shield or Physan 20. Always use gloves when using these products as severe skin irritation can occur. Be sure to read the labels carefully before using. My research shows that Green-Shield or Physan 20 is as effective as 10% bleach in disinfecting transplant trays. My research also shows that it is beneficial to leave trays in for the entire 10 minutes.
- Always use sterile soil mix. Use only clean tools. Do not dump your clean sterile mix onto a dirty surface.
- Greenhouses are easier to keep clean if the greenhouse floor is gravel or plastic that can be cleaned or replaced between transplant generations. Keep transplants off dirt floors where disease causing microbes may survive.
- Water early enough in the day to allow plant surfaces to dry out before nightfall. Water only when needed. On cloudy days when the soil surface is wet-let the hose rest!
- Scout greenhouses regularly for problems. Transplant trays with diseases should be thrown-out. Neighboring trays may look healthy but are very likely diseased and should be trashed.
- It may be helpful to keep specific lots of seeds in one area of a greenhouse so that if seed-borne problems arise, the lot involved can be identified. Keep good records of which lots were planted when.

Growers spend a lot on seed these days. It only makes sense to give those seeds the best start possible.

**Vegetable Seedling Disorders** - (*Dan Egel & Rick Latin*) - Seedlings are beginning to appear in greenhouses across Indiana. Not all seedlings will appear healthy. Below are some problems to watch out for. Disease causing microorganisms (pathogens) or the environment (e.g., heat, cold, pesticide, etc.) may cause problems such as those listed here.

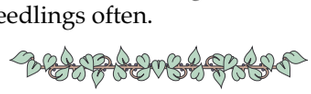
Infectious diseases caused by fungi or bacteria may be introduced on seed or survive on transplant trays (See extension bulletin *Preventing Seedling Diseases in the Greenhouse* (BP-61) web site: <http://www.agcom.purdue.edu/AgCom/Pubs/botany.htm#5> and/or the new transplant section in the *Midwest Vegetable Production Guide for Commercial Growers (ID-56)* web site: <http://www.entm.purdue.edu/entomology/ext/targets/ID/index.htm>. Infectious diseases often start on one or a few seedlings so that they usually occur in clumps of plants with similar symptoms.

Non-infectious disorders are sometimes known as "too much" diseases. Too much or too little water, sunlight, fertilizer, heat, etc may cause non-infectious problems. Such seedlings may occur along walkways, only at one end of a greenhouse or on nearly every plant in the greenhouse. Non-infectious disorders, although important, will not spread from plant to plant.

The following is a discussion of some of the important seedling diseases and disorders we see each year:

- **Damping-off**-Seedlings may collapse at the soil line. Often, the stem has a brown color at or just below the soil line. Soil fungi such as Pythium or Rhizoctonia may cause damping off. Water soaked or shrunken stem lesions (tan or brown) may be an infectious problem even though the stems do not collapse.
- **Wilting/yellowing**-Root diseases can result in wilted and yellowed seedlings. The roots may be brown. The soil fungi mentioned above may cause these problems.
- **Leaf spots**-There are many problems that can result in what we call leaf spots. More than 90% are non-infectious. If the spots are located only on the edge of the leaf or between the veins, it is likely that the spots are non-infectious. Seedlings with infectious leaf spots will occur in a clustered pattern within the greenhouse.
- **Leaf yellowing**-In most cases, yellowed leaves are not symptomatic of infectious problems. If the yellowing occurs only on the leaf margins and/or between the veins, the disorder is likely non-infectious.
- **Stunting**-Sometimes growers complain that their seedlings just are not growing. Often, this can be blamed on poor growing conditions. For example, seedlings that are grown too cold and/or too wet may end up stunted.

Managing transplant disorders relies on prevention since few fungicides are labeled for use in the greenhouse. Play close attention to greenhouse sanitation and scout your seedlings often.



Pumpkin News Letter - (*Dan Egel*) - Growers and other interested individuals may receive a quarterly newsletter dealing with pumpkins free of charge. The news letter is *SC Pumpkin News* produced by Clemson University in South Carolina. Growers should be aware that some of the problems discussed in *SC Pumpkin News* are different from those encountered in Indiana. For example, the disease downy mildew is a much worse problem in South Carolina than in Indiana. However, *SC Pumpkin News* should prove useful. To subscribe, mail your name, address, and E-mail address (if available) to *SC Pumpkin News*, c/o Dr. Anthony P. Keinath, Coastal REC, 2865 Savannah Highway, Charleston, SC 29414-5332.

**Seed and Root Maggots** - (*Rick Foster*) - Three species of seed and root maggots attack vegetables in Indiana. The seedcorn maggot feeds on seeds and seedlings of sweet corn, cucurbits, lima and snap beans, peas, and other crops. Cabbage maggots can cause serious damage to transplants of cabbage, broccoli, cauliflower, and Brussels sprouts and make the fleshy roots of radishes, turnips, and rutabagas unmarketable. Onion maggots are pests of seedling onions, developing bulbs and onions intended for storage.

Seedcorn maggot flies emerge in April and May and lay eggs preferentially in areas with decaying organic matter. Fields that are heavily manured or planted to a cover crop are more likely to have seedcorn maggot injury. Maggots burrow into the seed and feed within, often destroying the germ. The seeds fail to germinate and plants do not emerge from the soil, leaving gaps in the stand. When infested seeds germinate, the seedlings are weak and may die. Maggots also will feed within the stems of transplants.

Any condition that delays germination may increase damage from this pest. Damage can be reduced by planting into a well-prepared seedbed, sufficiently late to get rapid germination. The slower the rate of growth, the greater the likelihood of seedcorn maggot injury. Seed treatments of lindane, diazinon, or chlorpyrifos are an inexpensive method of reducing seedcorn maggot damage. For any type of early season transplant, soil temperatures should reach at least 72°F or more for 4-5 days in a row to avoid maggot injury. Anything that raises soil temperature (black or clear mulch) will increase soil warming and decrease the possibility of seedcorn maggot injury.

Soil insecticides applied to control other pests may also give moderate levels of seedcorn maggot control. Once damage is observed, the only management strategy available is the decision to replant or not. If you decide to replant, be sure to use treated seed. When resetting transplants be sure to wait 5 days from the first evidence of wilted plants before you reset.

Cabbage maggot injury is also favored by cool, wet conditions. The flies, slightly smaller than a housefly, emerge in late April or early May and lay white eggs at the base of newly set plants. Larvae from this first generation tunnel in the roots of small plants, causing the plants to appear sickly, off color or stunted, and may cause them to die. Early cabbage and turnips are particularly vulnerable to damage. Control of first generation maggots can be achieved using soil insecticides such as Lorsban, diazinon, and Dyfonate at planting or transplanting. For short season crops such as radishes and turnips, long-residual insecticides cannot be used. Cabbage maggots usually do not affect later planted crucifers.

Onion maggot flies emerge throughout May and lay eggs at the base of onion plants. The maggots attack the underground portions of the onion plants and cause plants to wilt and die. Seeded onions are more susceptible than transplanted onions. Do not overseed to compensate for losses to onion maggots. The flies do not space their eggs evenly, so you may end up with smaller bulbs because the plant spacing is too close. The second-generation flies emerge during July and the third generation emerges during late August and early September. Each generation will damage onions.

Removing cull onions after harvest and planting as far as possible from fields planted to onion the previous year can reduce damage. Soil drenches of Lorsban or Dyfonate at planting will effectively control first generation maggots and provide some control of the second generation. As the onions begin to mature, they become physically resistant to attack from onion maggots, unless they have been injured in some way. Be careful during field operations not to damage the growing plants in any way. A nick in an onion bulb allows the maggots to enter and begin feeding. Also, the flies are attracted to damaged onions to lay eggs. Reducing the amount of physical damage to the onions at harvest as much as possible will also reduce the amount of injury from the third generation. Do not apply foliar sprays to kill flies before they lay eggs.

**Insect Pheromone Traps** - (*Rick Foster*) - One method insects use to communicate with individuals of the same species is with pheromones. The most common type is the sex pheromone. Usually the females will emit a tiny amount of a chemical that attracts the male to her and increases the likelihood of mating. Because the chemical is volatile, air currents carry it. The male detects the pheromone in the air with receptors on his antennae. He then flies upwind to find the source of the pheromone, a prospective mate. The chemical composition of pheromones for a number of pest species have been identified and synthetic copies can be produced in the laboratory. Synthetic pheromones can be used in conjunction with traps to catch male insects. Some vegetable pests for which pheromones are available include corn earworm, European corn borer, cabbage looper, diamondback moth, and black cutworms.

There are a number of different types of pheromone traps. Many are made of paper and use a sticky material to catch the insects. Some use funnels and canisters to capture them. Either of these types of traps can be used for a number of different insect species, although only one pheromone can be used in a single trap. Two pests that require a special type of trap are the corn earworm and the European corn borer. The trap for this insect is a large (2-3 ft. diameter) screen cone. This trap is available made of wire or nylon. The wire version catches more moths, is more durable, but is bulky and awkward to transport. The nylon version will last a couple of years, catch about half as many moths, but is less expensive and more portable. The nylon version is available from most pheromone suppliers.

Listed below are several suppliers of pheromones and traps.

Bob Poppe's Service; R. R. #1, Box 33; Lexington, IL
Biocontrol Limited; 719 Second Street; Suite 12; Davis, CA 95616; 916-757-2307
Consep Membranes, Inc.; P. O. Box 6059; Bend OR 97708; 503-388-3688
Great Lakes IPM; 10220 Church Rd., NE; Vestaburg, MI 48891; 517-268-5693
Gemplers; P. O. Box 270, 211 Blue Mounds Road, Mt. Horeb, WI 53572; 800-382-8473
Insects Limited Inc.; 10505 N. College Avenue; Indianapolis IN 46280-1438; 317-846-3399

Pest Management Supply Co.; P. O. Box 938; Amherst, MA 01004; 413-253-3747
Scentry Inc.; P. O. Box 426, Dept. MPI; Buckeye, AZ 85326-0090; 602-233-1772
Trece Incorporated; P. O. Box 6278. 1143 Madison Lane; Salinas, CA 93912; 408-758-0204

To get the most from your pheromone traps, they must be used properly:

- Place the traps and the pheromones out before you would normally expect the insect pest to be active. That way you can monitor the adult activity, which will warn you that damage from the larvae may be coming soon.
- Be careful how you store pheromones. Ideally, they should be frozen until ready for use. At the very least, they should be refrigerated. If you keep them on the dashboard of your truck, they won't work well when you place them in the trap.
- When handling pheromone lures, do not touch them with your hands. Use a pair of forceps or wear latex gloves. This is especially important when you are using pheromones for more than one pest. Contamination of a lure with another pheromone will likely reduce the effectiveness.
- Lures usually should be changed every 3-4 weeks, although this will vary for individual lures.
- Check traps regularly, at least weekly. Daily would be better.

**Black Cutworms -** (*Rick Foster*) - Black cutworm moths have arrived in Indiana and are most likely mating and laying eggs. Early planted vegetables that are attacked by black cutworms could be subject to cutworm injury at this time. In areas where vegetables have not yet been planted, the usual scenario is for the moths to lay eggs on winter annual weeds. The eggs will hatch and the larvae will begin to feed. When you destroy the weeds via tillage or herbicides, the cutworms will no longer have a food source. When you plant vegetables, the hungry cutworms will feed on your crops. Cutworms problems are almost always spotty. Counts of moths in pheromone traps are not unusually high this year. So, don't treat for cutworms unless you start to see feeding damage. See the Midwest Vegetable Production Guide for Commercial Growers 2000 (ID-56) web site: <http://www.entm.purdue.edu/entomology/ext/targets/ID/index.htm> for specific information regarding insecticides for cutworms on individual crops.

**Seedless watermelon germination -** (*Dan Egel*) - Once again this year I have had several questions regarding the germination of triploid watermelon seed (seed for seedless watermelon). The critical items are:

- The temperature of the soil mix should be 85-95°F for 48 hours.
- The soil mix should be moist, not wet for the first 48 hours.

TEMPERATURE-The temperature of the soil mix has to be in the 85-95°F range for seedless watermelon to germinate. Growers should place the soil mix in the transplant trays to be used then water the trays and allow the soil mix to warm for 24 to 48 hours. Seeds should only be dropped when the temperature of the soil mix is already warm. Some growers prefer to mix hot water with the soil mix so that seeds can be dropped immediately.

MOISTURE-Most growers are surprised at how dry the soil mix can be and still support seedless watermelon germination. A simple test is to grab a fistful of soil mix and squeeze. If one can squeeze water out of the soil ball, the mix is too wet. If the soil will not form a "ball", it is too dry. Growers may want to "mist" the top of the mix on sunny days to keep the mix moist.

**The critical period:** The conditions of temperature and moisture outlined above should be maintained for approximately 48 hours. Seeds germinated at 85˚F usually require a longer germination period than those incubated at 95˚F. There appears to be some interaction between soil temperature and moisture: warmer temperatures may make up for too much soil moisture. When approximately one third of the seedlings have emerged, the seedlings should be introduced to moisture and temperature conditions more typical of standard diploid watermelon seeds (70 to 80˚F). If seedlings are kept at high temperatures too long, they may become tall and spindly.

Heat and moisture can be kept in the soil mix by laying clear plastic such as vis-queen over the tranplant trays at night. If plastic is kept on the trays during sunny periods, the seeds will become too hot and die.

I have seen all kinds of contraptions for germinating seedless watermelon. Many systems do not distribute heat to all trays evenly. Sometimes seedless watermelon are germinated in the dark. If this is done, make sure to take the seeds out of the dark before the seeds germinate.

Seedless watermelon cultivars differ in ease of germination. So your neighbor's system may not work for you.



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