

*Bacterial canker has been a serious problem for some local greenhouse tomato growers in recent years. Since there is no cure for this disease, prevention is the best solution to the problem. The recommendations in the following article represent a key step in a prevention program.*

## Preventing Bacterial Diseases of Vegetables with Hot-Water Seed Treatment

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**B**acterial disease of vegetable crops, such as bacterial leaf spot of peppers caused by *Xanthomonas campestris* pv. *vesicatoria*, bacterial canker of tomatoes (*Clavibacter michiganensis* pv. *michiganensis*) and black rot on cole crops (*Xanthomonas campestris* pv. *campestris*), have become all too common in recent years. Over 90% of the Connecticut pepper plantings inspected over the last five years were infected with bacterial leaf spot, sometimes resulting in complete crop failure but always drastically reducing profits. In 1993 and 1994, bacterial canker caused significant losses in tomato plantings throughout the Connecticut River Valley. When present, these diseases cause extensive crop destruction, due to the speed with which they spread and because chemical control often provides disappointing results.

These three disease-causing organisms can arrive on farms in infected seed and transplants or survive one or two winters on crop residues or for longer periods on weeds in the same botanical families as the host crop. Companies that produce seed take many steps, from inspecting seed production fields to testing seed in lots of 10 to 30,000, to try to ensure that it is free of bacterium. Many companies use chemical treatments, such as sodium hypochlorite, which sterilize the surface of the seed. However, chemicals do not reach infections within the seed. Research has shown that hot-

water treatment can penetrate the seed sufficiently to eradicate bacterial infections inside the seed.

There are only a few seed companies that routinely hot-water treat cole crop and tomato seed (not peppers, which are considered more fragile) or may do it on request. Their reluctance is understandable, since there is a risk that germination will be reduced if the water gets too hot or if the seed crop was grown under stressful environmental conditions. Thus, some varieties or lots are more vulnerable to heat treatment than others. One seed company reports, however, that they often see an 'increase' in germination rates after hot-water treatment, because other microbes that attack the seed during germination are killed.

If possible, buy hot-water treated seed. If the varieties you prefer are not available from a company that offers this service, treat the seed yourself. Hot-water treatment is easier, cheaper and more effective than trying to combat bacterial diseases in the field with chemicals.

Once you hot-water treat, the seed company's liability and guarantees are null and void, therefore, the following precautions and recommendations should be observed. It is important that the water be maintained at a uniform temperature throughout the vessel, that the recommended temperature of 122°F or 125°F (depending upon the crop) not be exceeded and that the seed be treated no longer than the time interval specified.

- Treat tomato seed at 122°F or 125°F for 25 or 20 minutes, respectively.
- Treat pepper, cabbage or Brussels sprouts at 122°F for 25 minutes.
- Treat cauliflower and broccoli at 122°F for 20 minutes.

1. Due to the expense of hybrid seed, it is recommended to treat a 100-seed sample and conduct a germination test in the greenhouse before exposing the whole lot to the high temperature bath. Treat a 100-seed sample of each lot number and variety and plant alongside an equal number of untreated seed in the same growing media that you plan to use for your transplant production.

2. It is recommended to use an accurate laboratory thermometer and a stirring hot plate to provide continuous agitation and uniform water temperature. Bring the bath up to the recommended temperature for the crop seed you are treating (122°F or 125°F). Wrap the seed loosely in a cloth or in cheesecloth, add a metal bolt or sinker to keep the seed submerged and proceed to soak it for the recommended interval. Check the temperature constantly. It helps to have a separate container of room temperature water close by to add, if necessary, to prevent overheating. Remove the seed after 20 or 25 minutes, cool the seed under tap water and air dry at 70°F to

75°F by spreading the seed on paper towels.

3. If the test treatment gives acceptable germination rates, treat as much seed as you expect to plant this year, carefully using the same procedure. Apply fungicide (i.e. Drexel Captan 4F) to the treated seed to reduce rot after planting. Read fungicide label for application instructions.

**We tried it!** In the spring of 1995, germination tests were conducted on five new lots (varieties) of **pepper** seed and one lot which was a year old. The hot-water treated seeds had an average germination rate of 95% (range of 89% to 99% across varieties) compared to 94% (range of 88% to 99%) for the untreated seeds. Ten weeks after the hot-water treatment, a second planting was made and again, there was no reduction in germination for treated seed. For additional information, contact **Jude Boucher** at UConn's Vernon Cooperative Extension Center, **860-875-3331**.

Experiments conducted at UMass in the winter of 1994, showed that hot-water treatment at 125°F for **30 minutes** caused reduction in germination ranging from 0.5% to 59% among seven different tomato varieties. The average reduction was 20%. Seed was planted at two-week intervals following the hot-water treatment. The germination rate of hot-water treated tomato seed did not decrease for up to 10 weeks following treatment. For more information, contact **Ruth Hazzard** at the UMass Vegetable ICM office, **413-545-3696**.

**In the case of vegetable bacterial diseases, an ounce of prevention (hot-water treatment) may be worth more than hundreds of pounds of chemical cure!**

You can order the necessary equipment from **Fisher Scientific**, 711 Forbes Avenue, Pittsburgh, PA 15219, 1-800-766-7000, or another laboratory supplier.

- Thermometer, 0°F to 220°F scale  
1995 cat. #14-983-15B, priced around \$8.75 each
- Stirring Hot Plate, 9"x 9" surface  
1995 cat. #11-498-7SH, priced around \$310

