D0064

UW Plant Disease Facts

Extension
UNIVERSITY OF WISCONSIN-MADISON

Provided to you by:

Hot-Water Seed Treatment for Disease Management

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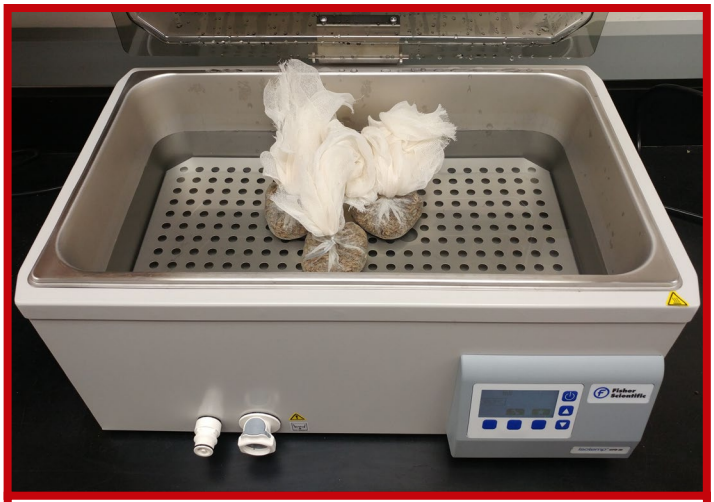
Growing vegetables from seed is a common practice for many home gardeners. Unfortunately, vegetable seed (even though it appears perfectly healthy) can sometimes be contaminated with disease-causing organisms, particularly disease-causing bacteria. Bacterial speck (see UW Plant Disease Facts D0011, *Bacterial Speck of Tomato*), bacterial spot (see UW Plant Disease Facts D0012, *Bacterial Spot of Tomato*), and stem canker of tomato, as well as bacterial spot of pepper and black rot of crucifers such as cabbage and broccoli (see UW Plant Disease Facts D0019, *Black Rot of Crucifers*) are common bacterial diseases where pathogens can be introduced into a garden via contaminated seed. Making sure your vegetable seed is pathogen free is an important first step in preventing these diseases from being a problem.



Hot-water treatments can eliminate disease-causing organisms from seed.

Hot-water seed treatment is one method that you can use to eradicate, or at least reduce the level of pathogens (particularly bacterial pathogens), in vegetable seed. Some commercial vegetable seed companies routinely use this method (as well as other more stringent decontamination methods) to eradicate pathogens. Hot-water seed treatments are effective because hot water soaks into the seed for a brief time and kills disease-causing organisms, without killing the seed itself. Other common seed treatments (e.g., fungicide treatments) can also help reduce disease, but typically do not eliminate pathogens that have penetrated the seed coat.

Hot-water seed treatment works best for small seed. It is not as effective for large or extremely fragile seed, pelleted seed, primed seed (i.e., seed treated to speed germination), fungicide-treated seed, and old seed. When using hot-water seed treatments, treat only the amount of seed that you plan on planting. Treatment temperatures and durations will vary depending on the particular crop (see Table 1).

To most effectively hot-water treat seed, use a water bath (in home cooking often referred to as a "water oven") with precise temperature and timing control. Such equipment will provide the most consistent and uniform heating, but unfortunately can be somewhat expensive. Alternatively (but much more of a challenge), you can try to use a large pan heated on a stove. In order for this method to work, you will need to use a precise thermometer to accurately and frequently measure any changes in temperature. In addition, you must mix the water thoroughly, adjust the stove settings appropriately and submerge the seed completely during the treatment process to ensure that the seed receive a constant and uniform temperature at all times. Water that is too hot may injure the seed; water that is too cold will not eradicate pathogens.

To hot-water treat seed, use the following steps:

- Wrap seed in a permeable cloth (e.g., cheesecloth);
- Thoroughly soak (removing any air) and pre-warm seed in 100°F tap water for ten minutes;
- Transfer seed to tap water heated to the crop-specific prescribed temperature (see Table 1);
- Place seed in cold tap water for five minutes to quickly end the heat treatment;
- Spread seed out on a paper towel or screen to air dry;
- Apply fungicide seed treatments according to the manufacturer's instructions (optional).

Revised
May 13, 2021

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Table 1. Hot-water treatment temperatures and timings by crop*

Crop	Temperature (°F)	Time (minutes)
Brussel Sprouts	122	25
Broccoli	122	20
Cabbage	122	25
Carrot	122	20
Cauliflower	122	20
Celeriac	118	30
Celery	118	30
Chinese Cabbage	122	20
Collards	122	20
Coriander	127	30
Cress	122	15
Cucumber	122	20
Eggplant	122	25
Kale	122	20
Kohlrabi	122	20
Lettuce	118	30
Mint	112	10
Mustard	122	15
New Zealand Spinach	120	60-120
Parsley	122	30
Pepper	125	30
Radish	122	15
Rutabaga	122	20
Shallot	115	60
Spinach	122	25
Tomato	122	25
Turnip	122	20

*Table modified from http://vegetablemdonline.ppath.cornell.edu/NewsArticles/HotWaterSeedTreatment.html.

For more information on hot-water seed treatment: Contact your county Extension agent.

Thanks to Diana Alfuth, Amanda Gevens and Christy Marsden for reviewing this document.