

## HOT WATER SEED TREATMENT (HWT); Our low-tech approach

Beth Kazmar/ Tipi Produce. Revised February, 2026

Hot water seed treatment is used to kill seedborne pathogens. Refer to the online document “Managing Pathogens Inside Seed with Hot Water” for a list of seedborne diseases of vegetable crops, and temperature/time protocols. It is important to treat your seed at the correct temperature and for the proper length of time. If the temperature is too hot, or the exposure too long, the seed can be damaged. Conversely, pathogens will not be killed if water is too cool, or the exposure is too short.

### RESOURCES:

- [“Managing Pathogens Inside Seed with Hot Water”](#)  
Excellent overview, with techniques and good lists of seedborne pathogens and temperature protocols for a wide variety of crops. Discusses equipment, including a recommended [mercury thermometer](#).
- [“Hot Water and Chlorine Treatments to Eradicate Bacterial Plant Pathogens from Vegetable Seeds”](#)  
Another good article.
- [“Hot water seed sterilization tool evaluation”](#)  
Evaluation of tools for hot water seed treatment, including sous vide.
- “How & why to treat seeds with hot water,” Growing For Market, January 2015  
This older article discusses an efficient way to hot water treat seed using mesh bags and a food dehydrator.
- Both University of Connecticut and University of Massachusetts offer mail-in seed treatment services.

**PLANNING. DECISIONS.** Let us share our experience treating tomato, pepper and brassica seeds.

- Decide if you need to treat your seed or not.
- At our farm, we do not hot water treat (HWT) seed that has been tested and found free of pathogens. Check your seed packet for testing information, or ask your seed rep about the lot you’ve received, or check my accompanying table for black rot of crucifers.
- Do not treat seed that has already been HWT’d.
- Many protocols advise not treating “older seed,” because older seed is more easily damaged by HWT. We do not HWT seed that we’ve had in storage for more than two years. On a practical basis, we have found it difficult to determine the age of freshly-shipped seed. Seed is often produced in large batches and stored for several years by the seed producer. The actual age of freshly-shipped seed is not something we have been able to learn easily from our seed suppliers. For now, we are ignoring this issue. FYI, the germination test date on the seed package does not tell you how old the seed is, just when the most recent germ test was done.
- Do not treat pelleted seed.
- Many protocols advise testing a small amount of seed first, and to do a small test with each cultivar and each seed lot. This is an excellent idea for your first attempt to HWT seed. We’ve abandoned these time-consuming pre-tests as we’ve gained experience and confidence.
- Fortunately, we have rarely (never?) seen the germination rate of hot-water-treated tomato seed drop below the germination rate on the seed packet. This reflects many years experience with tomato seed. Peppers and brassicas are reputed to be more sensitive to hot water treatment but we have not had problems in our years treating these crops.

Crops	Diseases	Hot water treatment
Peppers	bacterial diseases, viruses	125°F for 30 min.
Tomatoes, eggplant	bacterial diseases viruses	122°F for 25 min.
Brussels sprouts, cabbage	bacterial diseases (eg black rot), Alternaria	122°F for 25 min.
Broccoli, cauliflower collards, kale, kohlrabi, napa, rutabaga, turnip	"	122°F for 20 min.
Mustard greens, radish	"	122°F for 15 min.

**Basil or Arugula seed:** Do not attempt to HWT basil or arugula seed. Both form gelatinous coats once wet, making the seed almost impossible to handle after HWT treatment. FYT, High Mowing Seeds promises that all their arugula seed has been tested and is free of the black rot pathogen.

Minor brassica crops and other crops. Info gathered from a variety of sources.

## Table 1. Hot-Water Seed Treatment Protocols

Prepared by Margaret Tuttle McGrath, Cornell University, Long Island Horticultural Research and Extension Center, 3059 Sound Avenue, Riverhead, NY. mtm3@cornell.edu

Crop	Temperature and time	Reference
- Brussels sprouts <i>B. oleracea</i> var <i>gemmifera</i>	122°F 25 minutes	1, 3, 4
- Broccoli <i>B. oleracea</i> var <i>italica</i>	122°F 20 minutes	1, 2, 3
- Cabbage <i>B. oleracea</i> var <i>capitata</i>	122°F 25 minutes	1, 3, 4
Carrot	122°F 20 minutes	1, 2, 3
- Cauliflower <i>B. oleracea</i> var <i>botrytis</i>	122°F 20 minutes	1, 3, 4
Celeriac	118°F 30 minutes	3
Celery	118°F 30 minutes	1, 3
- Chinese cabbage	122°F 20 minutes	1, 4
- Collards <i>B. oleracea</i> var <i>acephala</i>	122°F 20 minutes	1, 3, 4
Coriander	127°F 30 minutes	4
Cress	122°F 15 minutes	1, 3, 4
Cucumber	122°F 20 minutes	1, 4
Eggplant	122°F 25 minutes	1, 3, 4
- Kale <i>B. oleracea</i> var <i>acephala</i> (Scablot green)	122°F 20 minutes	1, 3
- Kohlrabi <i>B. oleracea</i> var <i>gongylodes</i>	122°F 20 minutes	1, 3, 4
Lettuce	118°F 30 minutes	1, 3, 4
Mint	112°F 10 minutes	4
- Mustard <i>B. juncea</i>	122°F 15 minutes	1, 3, 4
New Zealand Spinach	120°F 60-120 mins	4
Onion (sets)	115°F 60 minutes	4
Parsley	122°F 30 minutes	5
Pepper	125°F 30 minutes	1, 3, 4
- Radish <i>Raphanus sativus</i>	122°F 15 minutes	1, 3
- Rutabaga <i>B. napus</i> var <i>napobrassica</i>	122°F 20 minutes	3, 4
Shallot	115°F 60 minutes	4
Spinach	122°F 25 minutes	1, 3, 4
Sweetpotato (roots)	115°F 65 minutes	4
(cuttings, sprouts)	120°F 10 minutes	4
Tomato	122°F 25 minutes	1, 3, 4
- Turnip <i>B. rapa</i> var <i>rapa</i>	122°F 20 minutes	1, 3, 4
Yam (tubers)	112°F 30 minutes	4

125°F = 51.5 °C    122°F = 50 °C    118°F = 48 °C  
 125.6°F = 52 °C    131°F = 55 °C    132.8°F = 56 °C

Mizuna *B. rapa* var *japonica*  
 Tatsoi *B. rapa* var *marinosa*  
 Yukina *B. rapa* (similar to tatsoi)  
 Pac choy *B. rapa* var *chinensis*  
 Arugula *Eruca vesicaria*

Broccoli raab *B. ruvo*  
 Kalestee turnips *B. rapa* (var *rapifera*??)

## SUPPLIES:

- Insulated container (I use a 3 gallon insulated water jug.)
- A piece of foam insulation to place under the insulated container, to reduce heat loss (optional).
- Something to inside the jug, to keep seed packets suspended above the bottom, eg an overturned bowl.
- Good quality thermometer. NJExtension recommends using a bundle of three [mercury thermometers](#) (\$14 each). I use an 8" digital  $\pm 0.2^{\circ}\text{F}$  thermometer, Traceable Products, item #4352, \$65.
- Wooden spoon
- RECOMMENDED: Mesh bags of fiberglass window screen (See more info below.)  
ALTERNATE: new floating row cover, cut in 12-inch squares + twist-ties + small washers to keep submerged
- Small binder clips in mixed colors
- Watch or clock
- Jugs of boiling water and cold water
- Bath towel, to cover jug while treating seeds
- If using mesh bags ... a dry space with fans (eg a greenhouse) OR food dehydrator
- If using row cover packets... paper towels to spread seed to dry OR food dehydrator (See GFM article.)  
If using a food dehydrator, have the heating element turned off or disconnected
- Clean coin envelopes, to package treated, dry seed.

## RECOMMENDED METHOD, WITH MESH BAGS:

1. Place seed in the mesh bag, add label, roll the opening shut, and clip with binder clips.
2. Attach the thermometer to the wooden spoon with rubber bands so the thermometer sensor tip is near the depth where the seeds will be.
3. Set up the insulated jug with water about 5-10°F hotter than the temperature you want. Place a piece of foam insulation under the jug to reduce heat loss. Place an overturned bowl or other support in the bottom of the jug. Cover and let sit until the temperature stabilizes, at least one hour. Stabilize the temperature at 2°F above your desired temperature. This will allow the water temperature to drop to your desired temperature when you add your seed packets. Stabilize at 1°F above your desired temperature if treating a small amount of seed. Stir occasionally. Add boiling water or cold water to adjust the temperature. Stabilizing the temperature takes time, but is an essential step.
4. Fill a pail with hot water at about 100 - 110°F. Place the pail next to the stabilized hot water jug. Submerge the seed packets in the pail. Swish or squeeze to force out air bubbles. Keep submerged long enough to warm the seeds and packet.
5. Transfer the wet packets into the stabilized hot water jug and swish/squeeze again to fill with hot water. Start the clock as soon as the packets are in the hot water. If necessary, adjust the temperature with small amounts of boiling water or cold water. If your water bath is large, float pieces of styrofoam on the surface to keep the water temperature stable. If using an insulated jug, put the lid on (keeping the thermometer in place) and cover with a folded towel to slow heat loss. Stir frequently. Monitor the temperature and adjust as needed.
6. As soon as the time is up, take the seed packets out and immediately submerge in cold tap water to cool the seed. Shake off excess water and blot with a towel.
7. Find a dry place with good air circulation to dry the seed in the mesh bags. Empty benches in your greenhouse will work. Shake the bags occasionally to speed drying. We complete the drying by placing mesh bags in a food dehydrator with the fan running but the heating element turned off. It is possible to skip the greenhouse step and dry the seed completely in the food dehydrator. However, we find this takes longer and limits the number of seed varieties we can treat at one time.



8. Transfer dry seed into clean coin envelopes. Don't return the seed to the original seed packets. Prop coin envelopes open for an extra day to dry.

*Back row, from left:* boiling water and cold water to adjust the temperature, towel to cover jug during HWT; insulated jug; pail of cold water to submerge seed after treatment.

*Center:* digital probe thermometer attached to wooden spoon.

*Front row, from left:* seed bundled in row cover square; seed in mesh bags; clean envelopes to store dry seed.



Left: Seed in mesh bags sewn from fiberglass window screen. Note the pocket sewn to hold a plant label in place. If you use two sizes of mesh, sew bags with different color thread for easy identification. Center: Adjust water temperature with boiling or cold water. Right: Sponge bags dry with a towel, then lay someplace with good air circulation. Shake bags occasionally to speed drying. When our greenhouse benches are full, we put the bags in the black crate at back, and suspend above the benches in front of a fan.

Mesh bags sewn from fiberglass window screen.

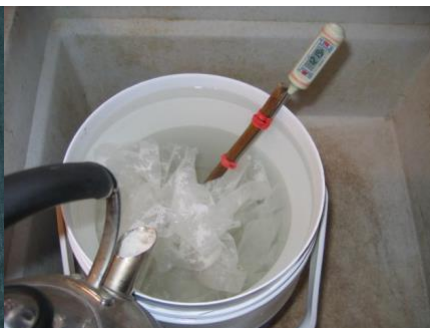
Screen is available in several mesh sizes. We initially purchased “window screen” at a hardware store with mesh of 13 x 7 threads per inch. Smaller seeds will pass through window screen, so it’s useful to prepare bags with “no-see-em screen” (20 x 20 threads per inch). Use row cover for the smallest seed. **“No-see-em” screen is the most broadly useful, with no downside to the finer mesh.** It’s worth the extra effort to find. We purchased a roll through Amazon.

**Our observations pairing screen size to seed size. M=1000 seeds.**

Crop	Window screen (13x7)	No-see-em screen (20x20)	Row cover
Cruciferous (choys, mustards)	less than 137M seeds/lb	172M – 232M seeds/lb	none as yet
Tomatoes (Supersweet 100)	less than 200M seeds/lb	192K – 290M seeds/lb	> 290M seeds/lb

**\*ALTERNATE METHOD WITH ROW COVER**, for very small seed, or if you don’t have mesh bags:

1. Wrap seed in a piece of row cover and close with twist-tie. Include a waterproof label in the packet. We use small pieces of cardstock. Add a bolt or washer to the twist-tie so the package does not float to the surface. You want it to float a few inches off the bottom of the container, so make the end of the twist-tie with the washer a few inches long.
- 2 – 6 and 8. Same as above.
7. Remove seed from the row cover, spread out on paper towels and dry thoroughly at room temperature. Keep your seed clearly labeled!



Left: Bundle seeds in row cover squares, with attached washers so packets do not float. Center: Adjust water temperature with boiling or cold water; Right: spread seed on paper towels to dry.

## IS CRUCIFEROUS SEED TESTED FOR BLACK ROT?

Updated Feb, 2026

"Yes" indicates seed shipped by the company tests free of the black rot bacterium in a sample of 30,000 seeds.

"+" indicates seed is tested for black leg.

CROP	JOHNNYS	HIGH MOWING	SEEDWAY	OSBORNE
broccoli	yes +	yes +		yes
brussels	yes +	yes +		yes
cabbage	yes +	yes +	All Bejo	yes
cabbage/napa	yes +	yes +	cruciferous seed	yes
cauliflower	yes +	yes +	is tested for	yes
collards	yes +	yes +	black rot and	yes
kale/ kalettes	yes +	yes +	black leg.	yes
kohlrabi	yes +	yes +	Do not HWT any	yes
lacinato	yes +	yes +	seed produced	yes
			by Bejo.	
arugula	no	yes +		no
Asian/mizuna	no	yes +	For all other	lot-by-lot
Asian/tatsoi	no	yes +	seed, info is	lot-by-lot
Asian/yukina	no	yes +	available on a	<i>not applicable</i>
chois (bok, pak)	no	yes +	lot-by-lot basis	lot-by-lot
mustard greens	no	yes +	because Seedway	lot-by-lot
radish	no	yes +	has a variety of	lot-by-lot
radish/daikon	no	yes +	seed growers.	lot-by-lot
rutabaga	no	yes +		yes
turnips	no	yes +		yes
cruciferous microgreens	no	yes +	?	no*
seeds for sprouting	no	<i>not applicable</i>	<i>not applicable?</i>	<i>not applicable</i>
cover crops/radish	no	yes +	yes	<i>not applicable</i>
cover crops/mustard	no	<i>not applicable</i>	yes	<i>not applicable</i>
NOTES	See	All cruciferous	Call	Call
	catalogue	seed sold by	sales rep.	sales rep.
	or call	High Mowing		
	sales rep.	is tested for		* They request testing
		black rot and		but few suppliers test
		for black leg.		microgreen seed.

## SOUS VIDE

I have not yet explored using a sous vide thermostatic control for hot water seed treatment. It's an appealing option that I will look into the next time I have to replace our digital thermometer. The cost of sous vide units has really come down, but there's variation in quality and accuracy. Read reviews before buying.

If you decide to use a sous vide apparatus, you will want to HWT your seed in mesh bags as described above. Do not vacuum seal your seed when using a sous vide set-up. The seed needs to be in contact with the hot water for the treatment to work.

## CUTTING AND SEWING MESH BAGS FROM A 36-INCH ROLL OF INSECT SCREENING

Use whatever combination of strips suits your needs.

Larger bags are useful for direct-seeded crops like radish that needed to be treated in quantity.

Smaller bags are usually sufficient for greenhouse crops like peppers.

