

George Leigh Minor Plant and Soil Health Center

Plant Diagnostic Laboratory
27A Manter Rd., Unit 4115 Storrs, CT 06269

PlantDiagnosticLab@uconn.edu
860-486-6271

Hot Water Seed Treatment

There are several plant diseases caused by fungal, bacterial, oomycete and viral pathogens that can persist on or inside seeds. At germination, infected seeds can serve as primary inoculum and result in infected plants. While chlorine and other chemical seed treatments can be effective at eradicating pathogens that adhere to the seed surface, these treatments are not able to penetrate the seed coat and eliminate pathogens that are present inside. As a result, hot water seed treatment has emerged as one of the best known methods to manage seed-borne pathogens, because of the treatment's ability to kill pathogens that exist both on the outside and inside of seeds.

It is important to note that while hot water seed treatment can eliminate pathogens on and in seeds, it neither protects nor guarantees that plants will remain disease free throughout the growing season. Hot water treatment will enable you to start with clean seed, and strong cultural management practices (i.e. crop rotation, field sanitation, scouting, etc.) will still be important to implement on plants that grew from hot water treated seed.

Important considerations to take before submitting seed for hot water treatment:

1. **Determine if the seed you'd like to treat is commonly associated with diseases caused by seedborne pathogens (Table 1).**
2. **Determine if the seed you'd like to treat is a good candidate for hot water treatment (Table 1).** Treating large-seeded crops such as beans, peas, cucurbits, corn, etc. that are not listed in Table 1 is not recommended because the temperature required to treat these seeds can kill the outer seed tissue and prevent germination.
3. **Determine if your seed has already undergone hot water treatment or if it has been primed.** This information is not always easy to find, so it is important to contact your seed supplier with specific questions. A few seed companies conduct hot water treatment, and treating the seeds a second time will damage the seeds and affect germination. Additional questions to ask include: have the seeds been certified disease-free? Were the seeds produced in a specific way to minimize exposure to seedborne pathogens?
4. **Determine if your seed has a fungicide or insecticide treatment coating.** This coating will wash away during hot water seed treatment, therefore rendering the coating useless. If the seed has a clay coating, this coating will also wash away but will not be detrimental to the seed.
5. **Determine the age of the seed.** Only treat seed that you plan to use within 1 year. Hot water treated seed does not remain viable for as long as untreated seed.

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Table 1. Vegetable crops suitable for hot water seed treatment, and their seedborne diseases that can be controlled.

Crop	Diseases Controlled
Beet / Swiss Chard	Phoma/Canker, Beet downy Mildew, Cercospora leaf spot
Brassicas	Alternaria leaf spot, Bacterial leaf spot, Black leg, Black rot
Carrot	Alternaria leaf blight, Bacterial leaf blight, Cercospora leaf spot, Crater rot/foliar blight
Celery / Celeriac	Bacterial leaf spot, Cercospora leaf spot, Septoria leaf spot, Phoma crown and root rot
Eggplant	Anthrachnose, Early blight, Phomopsis, Verticillium wilt
Lettuce	Anthrachnose, Bacterial leaf spot, <i>Lettuce mosaic virus</i> , Septoria leaf spot, Verticillium wilt
Onion	Purple blotch, Stemphylium leaf blight, Basal Rot, Botrytis blight, Smudge, Black mold
Pepper	Anthrachnose, Bacterial leaf spot, <i>Cucumber mosaic virus</i> , <i>Pepper mild mosaic virus</i> , <i>Tobacco mosaic virus</i> , <i>Tomato mosaic virus</i>
Parsley / Cilantro	Bacterial leaf blight, Alternaria leaf blight, Black rot, Cercosporoid leaf blight, Septoria blight
Spinach	Anthrachnose, Cladosporium leaf spot, <i>Cucumber mosaic virus</i> , Spinach downy mildew, Fusarium wilt, Stemphylium leaf spot, Verticillium wilt
Tomato	<i>Alfalfa mosaic virus</i> , Anthracnose, Bacterial canker, Bacterial speck, Bacterial spot, <i>Cucumber mosaic virus</i> , Early blight, Fusarium wilt, Leaf mold, Septoria leaf spot, <i>Tomato mosaic virus</i> , <i>Tobacco mosaic virus</i> , Verticillium wilt, Double virus streak

Table adapted from UMass Vegetable Extension

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Hot Water Seed Treatment Liability and Disclaimers

The University of Connecticut's Plant Diagnostic Laboratory ("UConn") follows established and tested protocols for hot water treating each species of vegetable seed to ensure the highest quality. Seed undergoes a pre-warming process in a controlled water bath at 100°F, then is subjected to treatment in another aerated warming bath at 118-125°F for 15 to 30 minutes depending on the crop. Seed is immediately air dried, carefully packaged, and shipped back to the grower at the address they provided. These protocols are designed to maintain or enhance seed germination if the appropriate seed (see table 1) is used, but we cannot guarantee that there will not be negative effects.

As a condition of submitting seed to UConn for hot water seed treatment, I, _____, acknowledge that I have been informed of the risks associated with the possible loss of seed viability and hereby forever waive, release and discharge any and all rights to assert any claim against UConn related to this agreement. UConn makes no warranties, either express or implied, and expressly disclaims the same, in connection with this agreement and the services and/or goods provided hereunder, including, without limitation, any warranties of merchantability and fitness for a particular purpose. UConn shall not be liable for any indirect, incidental, consequential, punitive, or exemplary damages of any kind, and I expressly acknowledge that UConn shall have no liability whatsoever for any damages, losses or other claims related to crop failure as a result of the use of this treated seed. The foregoing disclaimers and limitation of liability shall apply regardless of the form of action, whether in contract, warranty, strict liability, negligence, tort or other and shall survive a fundamental breach or failure of the essential purpose of the contract.

I hereby release from any and all liability and agree to defend, indemnify and hold harmless the State of Connecticut and UConn, including its Board of Trustees, employees, agents, and/or volunteers, for any liability in connection with this agreement, including the use of hot water treated seed. This release, defense, and indemnity is for any and all liability, property losses, or damage occasioned by, or in connection with this agreement, including the use of this hot water treated seed.

State Terms: The terms found at <https://uconncontracts.uconn.edu/wp-content/uploads/sites/458/2019/09/Revenue-Contract-State-Terms-Conditions-revised-09.17.19.pdf> are hereby incorporated by reference as if fully set forth herein.

I have read this entire agreement, including the Submission Form and other attachments hereto, and I fully understand it and agree to be legally bound by this agreement. This agreement contains the entire agreement of the parties relating to its subject matter and may not be amended, except in a writing signed by both parties.

Signature: _____ **Date:** _____

Print Name: _____

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Hot Water Seed Treatment Submission Form

Please provide return address where seed should be mailed	
Name: _____	Date received: _____
Business Name: _____	Payment: _____
Street Address: _____	Returned: _____
City, State, Zip: _____	Tracking: _____
Phone: _____	
Email: _____	

Treatment fees: Each variety will cost \$6 for each 0.01-1 oz of seed.

Return shipping & handling: \$6 for each 0.01-13 oz of seed

Mailing instructions: Clearly label each variety of seed, and ensure the label information matches the form below. Enclose all seed packages in a plastic bag to prevent water damage during transit. Place bag in a padded envelope or box along with this form, liability waiver, and payment. Mail to the UConn Plant Diagnostic Lab (address listed above).

Payment: Make checks payable to **UConn**. To pay by credit/debit card, visit: <http://s.uconn.edu/pay>

Office use only	Crop	Variety/Cultivar	Seed company	Lot #	Ounces	Fee (\$)
Subtotal					oz	\$
Total (including \$6 S&H for each 0.01-13 oz)						\$