

## Using Sous-Vide Machines for Hot Water Seed Treatment

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Figure 1. Sous vide machine heating water for spinach seeds enclosed in a cheesecloth bag

Hot water seed treatment is a task that often falls on the list of “should do’s” in the winter and early spring, but sometimes falls by the wayside. Treating seeds in a hot water bath can help prevent serious bacterial, fungal, and viral diseases by killing pathogens harbored within the seed. The practice is recommended for both seed collected on the farm and purchased from commercial sources. However, it’s sometimes difficult to know which seeds to invest in treating, and whether it’s worth the time or cost. In the past, hot water seed treatment at home meant investing in rather costly laboratory hot water baths or taking a chance on less reliable stovetop methods. With the popularity and availability of “sous vide” machines, hot water seed treatment is easier, and more predictable than ever.

### What is a sous vide machine?

*Sous vide*, pronounced “soo veed,” means “under vacuum” in French. Sous vide machines are cylindrical kitchen gadgets that circulate and heat water to create a hot water bath (Fig.

1). The device can be clipped to the side of a large saucepan or other container that holds water. Because the device circulates the water as it heats, the water bath retains a very consistent temperature. The typical use of a sous vide machine is for cooking meat or vegetables. The food is sealed in a plastic bag, placed in the water, and cooked to desired temperature without burning. After the food has been steamed and cooked within the bag, it can be taken out of the plastic and seared in a pan or in the oven to finish before eating.

What makes the sous vide machine great for cooking also makes it ideal for treating seeds. Water baths with steady temperatures help ensure the seeds are treated at the precise temperature to kill pathogens without harming the seed embryo.

There are various types of sous vide machines. Some are more sophisticated and costly than others (~\$200 each), and are controlled via a phone app. Other simpler models, many less than \$100, are programmable by controls on the device itself and are easy to use.

### Which seeds should you treat?

Hot water treatment has varying degrees of efficacy depending on the size and structure of the seed and the characteristics of the pathogen. Tomato, pepper, *Brassica*, and spinach seeds are a few crops that are recommended for treating in our region. Some important and common diseases are successfully killed by hot water treatment in these species. For example, heat treating tomato seeds can prevent serious bacterial infections (such as bacterial spot, speck, and canker) that are difficult to manage once established on the farm. For a list of crops, pathogens, and seed treatment protocols, see Cornell’s Dr.

Meg McGrath's useful reference table online, listed below. Before treating any seeds, be sure to check with the seed supplier to make sure that the seed hasn't already been treated. Double heat-treating seeds can reduce germination. Also be aware that old seeds and coated seeds should not be treated. Hot water can harm older seeds and reduce germination, and seed treatments can be washed off in a water bath.

### **How do you use the sous vide machine to treat the seeds?**

Many excellent sources are available with detailed procedures on how to use hot water treatments for seeds (see references below). Instead of using two hot water baths, you will need two sous vide machines. One will be for pre-warming the seed (usually to around 100 degrees F) to reduce shock to the embryo from the hot water bath using the second sous vide. Because sous vide machines circulate water on their own, there is no need to stir the water manually, as you would need to do if using a stovetop burner and saucepan. Be aware that sometimes the water circulation can cause mesh seed bags and string to get sucked into the circulator. You can prevent this by securing the bag to the pot or container in some fashion. Although plastic vacuum bags are used when cooking food with the sous vide machine, it's recommended to adhere with typical seed treatment protocols and use mesh bags (Fig. 1). Hot water treatment procedures were developed based on porous bags, and the efficacy of seed treatments in plastic bags is not known.

Allow the device a few minutes to bring the water up to temperature before starting treatment. Check the temperature of the water using a handheld thermometer to be sure the device is functioning correctly. Once both baths are at the desired temperature, you are ready to go.

Hot water seed treatment can seem like a burdensome task during the busy pre-season, but it's well worth the time to prevent serious disease problems in the future.

### **References and suggested viewing:**

Details on hot water seed treatment protocols, including table with procedures for crops and pathogens:

Managing pathogens inside seed with hot water, by Meg McGrath, Andy Wyenandt, and Kris Holmstrom. <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/managing-pathogens-inside-seed-with-hot-water/>

How-to video:

<https://www.youtube.com/watch?v=tLalwbUigsk&feature=youtu.be>