

# Vegetable Seed Sanitation: Best Practices to Ensure On-farm Food Safety



Although the presence and persistence of pathogens that cause foodborne illnesses on seed are not yet fully understood, pathogen-infested seeds are a potential food safety hazard.

It is well known that seed-borne plant pathogens can cause disease or death of plants, resulting in crop and economic losses. Seed sanitizing treatments can be used to prevent seed-borne plant diseases, especially those caused by bacteria, and can minimize the potential risks associated with seed contaminated with foodborne pathogens.

## What You Should Know BEFORE Treating Vegetable Seeds

- Improper use of seed treatments can damage or kill the seeds. Always read and follow seed treatment instructions carefully.
- Always test the treatment process on a small sample of seeds BEFORE treating all of the seeds in a lot. (See testing procedure below.)
- Always use “raw” seeds that have not been treated with fungicides or other products, pelleted or previously subjected to any other treatments. Most seed coatings are soluble in water, so the coating will be compromised when treated with water-based sanitizing treatments.
- Registered fungicides, to prevent soil-borne fungal diseases, can be applied to seed following seed sanitation. A list of registered fungicides for vegetable seeds is provided in the Southeastern U.S. Vegetable Handbook ([www.thepacker.com/grower/2015-southeastern-us-vegetable-crop-handbook](http://www.thepacker.com/grower/2015-southeastern-us-vegetable-crop-handbook)).
- Seed quality warranties may become void when additional seed treatments are applied after sale.
- Never apply more than one of the treatments described below to seeds.

## Procedure for Testing Seed Germination After Sanitation With Chlorine or Hot Water

1. Randomly select 100 seeds from each seed lot.
2. Treat 50 seeds using chlorine or hot water.
3. After the treated seeds have dried, plant the treated and untreated seeds separately in flats containing seedling planting mix according to standard practices. Label each group as treated or untreated.
4. Allow the seeds to germinate and grow until the first true leaf appears (to allow for differences in germination rates to be observed).
5. Count seedlings in each group separately.
6. Determine the percentage of germination for each group. (The percentage of germination, can be computed by this formula: Percentage of germination = number of seedlings emerged ÷ number of seeds planted x 100.)
7. Compare percentage of germination between the treated and untreated groups. Percentage of germination should be within 5 percent of each other.

## Chlorine Bleach Treatment

Treating seeds with a solution of chlorine bleach can effectively remove bacterial pathogens and some viruses (such as tobacco mosaic virus) from the surfaces of seeds.

A “how to” video in English and Spanish is available on the LSU AgCenter’s YouTube page at [https://www.youtube.com/watch?v=le3H\\_icKWb4](https://www.youtube.com/watch?v=le3H_icKWb4). The basic steps are:

1. Add 1 quart of chlorine bleach (5.25-6 percent) to 5 quarts of potable water
2. Add a drop or two of liquid dishwashing detergent or a commercial surfactant such as Activator 90 or Silwet to the disinfectant solution.

3. Add seeds to the disinfectant solution (1 pound of seeds per 4 quarts of disinfectant solution) and agitate for 1 minute.
4. Prepare fresh disinfectant solution for each batch of seeds to be treated.
5. Rinse the seeds in a cold water bath for 5 minutes to remove residual disinfectant.
6. Spread seeds evenly on clean paper towels or a sanitized drying screen to dry. Do not dry seeds in areas where fungicides, pesticides or other chemicals are located.

### Hot Water Treatment

By soaking seeds in hot water, seed-borne fungi and bacteria can be reduced, if not eradicated, from the seed coat.

Hot water soaking will not kill pathogens associated with the embryo and will not remove seed-borne plant viruses from seed surfaces, however. Hot water treatment will NOT reduce *Salmonella* on infested seed.

A “how to” video in English and Spanish is available on the LSU AgCenter’s YouTube page at [https://www.youtube.com/watch?v=le3H\\_icKWb4](https://www.youtube.com/watch?v=le3H_icKWb4). And here are the basic steps:

1. Place seeds loosely in a weighted cheesecloth or nylon bag.
2. Warm the seeds by soaking for 10 minutes in 100 degree Fahrenheit water.
3. Transfer the warmed seeds into a water bath *already* heated to the temperature recommended for the vegetable seeds being treated (Table 1). Seeds must be completely submerged in the water for the recommended amount of time. Agitation of the water during the treatment process will help to maintain a uniform temperature in the water bath.
4. After treating with hot water, transfer the seeds into a cold water bath for 5 minutes to stop the heating action.

5. Remove seeds from the cheesecloth or nylon bag and spread them evenly on clean paper towels or a sanitized drying screen to dry. Do not dry seeds in areas where fungicides, pesticides or other chemicals are located.

Vegetable Crop	Water Temperature (°F/°C)	Soaking Time (Minutes)
Broccoli	122/50	20-25
Brussels sprout	122/50	25
Cabbage	122/50	25
Carrot	122/50	15-20
Cauliflower	122/50	20
Celery	122/50	25
Chinese cabbage	122/50	20
Collard	122/50	20
Cucumber*	122/50	20
Eggplant	122/50	25
Garlic	120/49	20
Kale, Kohlrabi	122/50	20
Lettuce	118/48	30
Mint	112/44	10
Mustard, Cress, Radish	122/50	15
Onion	115/46	60
Pepper	125/51	30
Rape, Rutabaga	122/50	20
Shallot	115/46	60
Spinach	122/50	25
Tomato	122/50	25
Turnip	122/50	20

\*Cucurbits other than cucumbers can be severely damaged by hot water treatment and should be disinfested using chlorine bleach.



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