

How Clean Is It?

Did You Sanitize, Degerm, or Disinfect?

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Many gardeners clean their tools after use to remove dirt and anything else that might spread plant diseases. The terms *disinfect* or *degerm* are sometimes used to describe, respectively, the effect of wiping tools with rubbing alcohol or scrubbing using a brush with a non-abrasive cleanser.

The viral pandemic has made us even more aware of the terms: *antiseptic*, *disinfection*, and *sanitization*. But what do these and other methods of controlling the growth of microbes actually mean? Science uses specific terminology to describe these states of cleanliness.

Most materials used in laboratory science experiments must be *sterile*. Materials are said to be sterile after the removal of *absolutely all life forms*. Laboratory science uses different techniques to produce this pinnacle of cleanliness depending upon the object's composition (glass, plastic, rubber, etc.) and properties (liquid, solid, heat sensitive etc.). As Master Gardeners we can generally forget about trying to reach this level of perfection just to work in the garden or home. In fact, most things in life do not need to be sterile. But what about other levels of cleanliness that are less stringent, those in which not all microbial life is eliminated?

A simple definition of "microbes" includes bacteria, fungi, virus, and parasites. Almost all are microscopic in size, but certain fungi and parasites are big enough to see without a microscope. Although viruses do not possess all the characteristics required to be considered "alive", such as being able to reproduce (they cannot reproduce without using a host cell), for convenience they are grouped with microbes. They are too small to be seen with a light microscope and the average virus is about 1000 times smaller than the smallest filter or facemask pore size. Prions are even smaller than virus and generally not well understood.

We share the world with a fog of microbes on land, in the water, and air and most do us no harm, some are even beneficial. But a small group, the pathogens, cause disease and common cleaning methods strive to eliminate them. These levels of cleanliness are defined (Bauman, 2020) as:

- **Antisepsis** is a *reduction in the number* of microbes, especially pathogens on *living tissue*. Not all microbes are eliminated but the more fragile pathogens should be reduced or removed. Example: An alcohol swab used on skin before an inoculation.
- **Degerming** is the removal of many microbes by *mechanical means* such as a stiff brush. Not all microbes are eliminated. Example: Scrubbing with a brush and cleanser.
- **Disinfection** causes the destruction of most microbes on *inanimate, non-living objects*. Not all microbes are eliminated. Example: Wiping a kitchen counter with disinfectant cleanser.

- **Sanitization** is the *removal of pathogens, but not all other microbes*, from objects to meet public health standards. Not all microbes are eliminated but at least the common pathogens are removed. Example: Cleaning restaurant dishes in a dishwasher.
- **Sterilization** is the *destruction of all microorganisms* in or on an object. Different objects require different techniques, some include dry heat, high moist heat plus increased atmospheric pressure, filtration (pore size less than 45 nm), and UV radiation. All these techniques require specialized laboratory equipment. Example: Autoclaving (increased pressure and moist heat) on metal dental implements.

Master Gardeners recommend to clean garden tools using a soft wire brush and liquid non-abrasive cleanser followed by wiping with isopropanol or other disinfectant to help temporarily remove some but not all microbes. See other tips on caring for garden tools at <https://www.mastergardenersd.org/garden-tool-care/>.

Understanding these cleaning methods helps determine which to use to complete the task at hand. It can also protect us from harm to know what is and isn't eliminated when using an antiseptic, sanitizer, or disinfectant cleanser. Washing hands, a mechanical action of the hands rubbing together, using soap and water is more effective than sanitizers alone. In addition, hand washing after working in the garden can help remove pesticides, microbial pathogens, and harmful heavy metals such as lead, arsenic, and mercury found in soil.

Bauman, R. (2020). *Microbiology with Diseases By Taxonomy*. San Francisco: Pearson.