

# Titanium Dioxide as a Disinfectant in Hydroponic Gardening

As I have said on previous posts, the problem of disinfection in hydroponic gardening continues to be a main issue in the area of soil less culture. Although there are many chemical solutions such as sodium hydrochloride and hydrogen peroxide, they continue to be non discriminant oxidants with the potential to damage roots and more importantly beneficial symbiotic microorganisms. Therefore, the use of chemical disinfectants takes away the possibility of using applications of beneficial organisms to boost crop yields.

Non chemical ways of disinfecting nutrient solutions do exist but are most of the time extremely expensive and only viable to large commercial growers. Examples of these are UV and ozone sterilization. Both processes are more friendly than chemical disinfectants and are friendly with root beneficial microorganisms, their only drawback is the high cost and difficulty of installation.

Nonetheless there is another potential way of sterilizing nutrient solutions which is both economically feasible for small growers and friendly with beneficial microorganisms that interact directly with plant roots. This new sterilization mechanism uses titanium dioxide as a mean of fighting pathogens inside the hydroponic nutrient solution.

Titanium dioxide is an innocuous, insoluble solid which is vastly used in the food and paint industry. Besides this, anatase, a specific crystalline form of this material, has very interesting photocatalytic properties. For example, when irradiated with UV rays (the sun's being enough) anatase is able to decompose organic matter into non harmful chemicals. It has been widely studied as a means of replacing hypochloride in water treatment plants and now offers a great way to sterilize nutrient solutions in hydroponic growing.

Degussa P25, an anatase containing nano crystalline commercial form of titanium dioxide, is very cheap and adequate for its use as a sterilizer in hydroponic growing. Simply, the solution is passed through a shallow open container that has several tiles of cheap glass covered with a small layer of sintered Degussa P25. This sterilizer can eliminate microorganism spores, bacteria, etc, from the nutrient solution while keeping costs and chemical disinfection down to a minimum. This is something I am going to try in the near future so stay tuned to see my results ! (below, a SEM image of titanium dioxide nano particles)



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