

Using Hydrogen Peroxide in Hydroponic Crops

As we all know, hydroponic growers face the challenge of maintaining pure and innocuous solutions that should be free of any type of bacteria, algae or any other microorganism. The growth of any of these organisms inside the nutrient solution carries with it the imminent possibility of plant disease as well as an increased risk of malnutrition and of course, nutrient deficiencies.

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Algae, in particular, are one of the most troublesome organisms as they are found everywhere and they grow ecstatically inside a hydroponic nutrient solution (after all, they are photosynthetic organisms !). These little creatures love to colonize plant roots (depriving them of food) and also consume a large proportion of the nutrients present inside a hydroponic solution.

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So what should a concerned grower do about the incredible problem of algae growth ? Nature has given us part of the answer in the form of a powerful oxidant called hydrogen peroxide. This molecule, whose formula is basically H_2O_2 decomposes forming molecular oxygen and water. It also reacts with organic matter in a redox reaction to oxidize it. In other words, algae and hydrogen peroxide cannot coexist.

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However, there is an important problem that arises when using hydrogen peroxide. It does not discriminate between roots and algae so using more than the optimum amount leads to plant root death caused by the same quality that kills algae. So what is this optimum amount ?

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I would love to show you a peer reviewed article that studied this issue but, as a matter of fact, no one has actually studied the levels at which these conditions are right at a scientific level. Most of what we know is currently empirical. Nonetheless, I have – from personal experience- verified that the application of 1mL of hydrogen peroxide (3% v/v) per liter

of nutrient solution every week does seem to prevent algae and does not damage plant roots.



FAQ – Growing media in hydroponics

In this section I will answer some of the questions that I have already answered in mails that have been sent to me, and that I believe will be helpful to most of the people interested in developing hydroponic crops. This FAQ covers the essential part about the hydroponic growing media and some advice based on my experience and personal knowledge.

What is the aim of the growing media in hydroponic crops and what is it?

The growing media is the substance over which the roots of the growing plants are supported. The plants can grow in either solid support media or simply over water. The function of the growing media in hydroponic crops is totally different from the one achieved by soil in traditional cultivation, because in this case the growing media is just the plants' mechanical support and it's not involved in any other growing process.

Which is the ideal growing media for hydroponic crops?

The ideal growing media is the one that can supply the plant's necessities of air, water and support; the media has to have a favorable interaction with water in order to maintain the humidity for a long time and it also has to have particles big enough to let the air flow and therefore, allow the oxygen to dissolve in the nutrient solution.

The ideal growing media has to be chemically inert for both

the nutrient solution and the plant, and it shouldn't modify neither the pH nor the solution's nutrient balance. Additionally, the media shouldn't have a significant reaction with any of the substances excreted by the plant.

The media should also be biologically inert, which means that it shouldn't contain any organism that might alter the solution's composition (like algae) or damage the plant (like pathogen micro organisms).

Which growing media are available?

There is a great variety of growing media available in today's market. The first criterion to choose a growing media is the kind of plant that will be cultivated. The second criterion is the price, because even though the media isn't ideal for the plant, the lower price and the fact that it is more available locally are also important. Some of the most popular media are described as follows:

Perlite is a type of amorphous volcanic glass with a high content of water. For this media to be usable in hydroponic crops it has to be heated to 900°C so the water contained in the crystalline structure liberates and therefore the commercial perlite is obtained, also known as expanded perlite. This type of perlite has a great water retaining capacity, leaving enough space for airflow. The size of the particle in this media is also ideal for big plants' support. The only problem with perlite is the fact that in most of the cases it has to be imported, limiting its use.

Vermiculite is a clay that expands in a limited way with heat. Once expanded, it provides the ideal conditions to be used on hydroponic crops. Nonetheless, this material also has a high cationic exchange capacity which may cause alteration of cation concentrations in the nutrient solution. This could be positive or negative, depending on the hydroponic formulation and on the plant.

Sand is a granular material, generally obtained from any mineral that has been finely divided. This type of material is ideal for hydroponic crops when combined with other materials that can provide a good airflow, because sand by its own can't provide enough space for airflow and therefore the plants could easily die.

Rice husk is an organic substrate obtained from rice plants. The advantage of this material is that it doesn't have a fast decomposing, due to its high silicon content. Nonetheless, it has a high water resistance, although it can provide a great airflow. A mixture between rice husk and sand is ideal for hydroponic crops, taking into account that the proportions can vary according to the plant's necessities. To prevent the rice seed from growing or fermenting and cause a drastic change in the solution's temperature, it's important to wet the rice husk before growing the hydroponic plants. The idea is to maintain the rice husk for at least a day under water before using it.

Gravel. The word gravel refers to any mineral or rock which has particles of a size between 5mm and 2cm. Gravel provides an excellent airflow and drain, but a bad water retention. When mixed with sand it could provide an ideal growing media, although it's also ideal for NFT systems because it doesn't block pipes or moves as easily as the rice husk does.

How do I choose a growing media?

Choosing the growing media mostly depends on the particular experience. For drop irrigation systems I recommend to use a mixture of rice husk and sand, or to use perlite. For NFT systems I recommend gravel or vermiculite. When choosing a growing media it's important to take into account the necessities of the plant for it to have the best possible development.

For how long can I use the growing media?

This depends on the nature of the media. Non-organic media such as perlite or gravel can be used many times, while organic media such as rice husk need to be renovated once or twice a year.

What treatment should the growing media receive between different crops?

Between crops the media should be washed with disinfectant. Personally I prefer to use hydrogen peroxide because it can be later removed by the own plants. The system must be irrigated during a whole day with the hydrogen peroxide solution at 3%. After this, the system must be irrigated for two more days with common water and it will be ready to use again.

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