

USING HYDROGEN PER OXIDE IN GREENHOUSE CROPS MANAGEMENT

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Why to use Hydrogen per oxide?

For some time growers have been asking us to investigate if hydrogen per oxide can be used to control algae and root related problems in greenhouse crops. There were reports from hobbyists that it can be used in hydroponic systems and helped with plant growth.

Dairy industry uses hydrogen per oxide for different disinfection purposes. We started looking at hydrogen per oxide and found that in the laboratory situations it can reduce the populations of various disease causing fungi like *Fusarium* and *Verticillium* and during that research found that it also reduced the development of algae in rockwool blocks. Many bedding plant growers who constantly complained about the growth of slime and algae in plugs and larger containers started using hydrogen per oxide in their water supplies and reported a reduced incidence of algae and less plugged up water lines. Many tree seedling growers used concentrations of up to 4% to spot treat algal and moss growth and reported good success. The information below is based on our research. Like other chemicals, damage to leaves is possible if applied under very hot conditions or if plants under stress and if the rate is too high. A study was completed with seedless cucumbers where we supplied 30 ppm of hydrogen per oxide along with the fertilizers. Root health was monitored by examining pythium colonization on them. There was no significant differences in marketable yields.

How to use Hydrogen per oxide?

Hydrogen per oxide is available as food grade 35% or technical grade 50%. It can be purchased in 50 gallon drums or in smaller quantities. Drug stores carry a 3% dilution. Based on our research we recommend a rate of between 30 to 50 ppm as a constant feed to your plants or 100 ppm for treating water in a storage tank. Here are our suggestions.

1. If you have a water storage tank then apply 100 ppm of hydrogen per oxide inside that tank. Assuming that you have a 2000 litres storage tank and have 35% hydrogen per oxide then you will need 571 millilitres to be added to the tank. You can inject it in the incoming line or add to the tank and mix it well. While injecting it is preferable to use plastic or PVC materials. Hydrogen per oxide gets inactivated once it comes in contact with organic matter which includes fungal spores or mycelium, algae, dissolved organic matter and other sources of organic materials. It will also react with iron and manganese present in your water and can precipitate it out. Precipitation of iron and manganese at 30 ppm of hydrogen per oxide does not appear to occur. If you have 50% hydrogen per oxide then you will need 400 ml in 2000 litres of water.

The formula to calculate ppm is:

$$\frac{\text{PPM required} \times \text{Total amount of water in Litres}}{\text{Grade of hydrogen per oxide} \times 10}$$

The result is the amount needed in grams of hydrogen per oxide. For practical purposes we will use the amount in millilitres. One millilitre of water weighs one gram while one millilitre of hydrogen per oxide may not weigh one gram but is pretty close.

You can easily calculate ppm of hydrogen per oxide required from the amount of water you are going to use.

2. If you have an injector system then use a separate injector for hydrogen per oxide. Once diluted it can be mixed with the fertilizer solution. Let us take an example of an Anderson Fertilizer Injector. You are already using three heads for injection. The first head is for calcium nitrate, the second head is for all other fertilizers and the third head is for acid injection. Install a fourth head to inject hydrogen per oxide. It should be placed in the beginning so that any pH changes can be adjusted. Like your fertilizers you have to calculate the amount required to be injected. Let us take an example:

In case of bedding and flowering plants we want to use 50 ppm of hydrogen per oxide. Your stock tank is 200 litres and at a dial setting of #10 your injection ratio is 1:190 This means that 200 litres of stock solution will be utilized in $200 \times 190 = 38,000$ litres of water. Using 38,000 litres as the amount of water, plug in the figures in the above mentioned formula.

50 ppm required x 38,000 litres of water divided by 35% hydrogen per oxide and multiplied with a factor of 10 = 5428.5 millilitres or 5.42 litres.

So, you will take 5.42 litres of 35% hydrogen per oxide and mix it with 200 litres of water in the stock solution and inject it through your 1:190 injection system. We found that hydrogen per oxide is unstable and we may not get the desired concentration. By using distilled water to mix the hydrogen per oxide and by covering the stock tank with black plastic and by using plastic parts in the injector system you can improve the stability of hydrogen per oxide. Once it is mixed with the fertilizer solution it will reduce in its strength but by that time it has done its job. Having hydrogen per oxide testing strips is valuable to find out how much final strength is being delivered to the plants.

If you have 50% technical grade hydrogen per oxide then using the same calculation as above you will require 3.8 litres in 200 litres of stock solution.

Further suggestions:

Vegetables: It can be used for all vegetable transplants grown in peat moss, rockwool and other growing media. Use 30 ppm for young vegetable transplants right from the beginning of watering. Increase the rate to 50 ppm when the transplants are 4 weeks old. Continue with 50 ppm on mature crops.

Bedding plant plugs: Use 50 ppm hydrogen per oxide treated water right when you start watering. Once plugs have germinated then use 30 ppm as a constant feed along with the fertilizers. After 4 weeks resume 50 ppm feeding.

Tree seedlings: Use 50 ppm as a constant feed. If you use it right from the start you will notice less algae and moss development and consequently less fungus gnats. Growers have used higher rates to spot spray rapidly developing moss on the surface of the plugs.

NFT Cucumbers and Tomatoes: Use 30 ppm in the recirculating tank. Monitor the amount by using the testing strips. Under normal conditions the amount of hydrogen per oxide will be less than 5 ppm after it has gone through the root zone.

Hydroponic Herbs in recycling system: Use 5 ppm in the recirculating tank.

Under benches and floor disinfection: Use 3-4% solution once and repeat if necessary

Where can I buy hydrogen per oxide?

Hydrogen per oxide is available from chemical supply stores. We have found a supplier in Leduc who will sell you in small or large quantities. It is Worldwide Ozone at 403-986-6441. In Edmonton contact Van Waters & Rogers at 452-6655

How to test the level of hydrogen per oxide?

Testing strips are available from Hydro-Gardens at 800-634-6362. There may be other suppliers.

Precautions: Hydrogen per oxide is corrosive and should be handled with care. Use rubber gloves and eye protectants when handling the material. Use proper make of pumps to inject hydrogen peroxide into water. Metal parts may corrode.

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