



St. Augustine Orchid Society

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Hydrogen Peroxide

by Sue Bottom, sbottom15@gmail.com

Most medicine cabinets have a brown bottle filled with hydrogen peroxide, used to help prevent cuts and scrapes from becoming infected. Hydrogen peroxide is water combined with an extra atom of oxygen, having the chemical formula H_2O_2 . The compound is unstable, ultimately converting into water and oxygen, although radical intermediates can be produced in the decomposition process. These reactive oxygen compounds are what makes hydrogen peroxide useful as a disinfectant and sterilant in your battle against disease organisms. Keep a fresh bottle handy in your growing area. There are many ways to use it on your orchids.



1. Look for the hydrogen peroxide sold in small spray bottles. Keep a bottle in your growing area so you can treat small problems before they become big problems.



2. Leaf rots are not uncommon after an extended period of rainy weather. Remove severely damaged tissue and spray with peroxide to prevent the rot from spreading.

Foliar Diseases. Hydrogen peroxide is a simple, cheap and amazingly effective anti-bacterial and anti-fungal agent, although it is not registered or labeled for this use. The 3% strength version sold in drug and grocery stores can be used full strength on your plants. Search around for the 8 oz (237 ml) spray bottle of hydrogen peroxide and keep it handy in your growing area. It kills bacteria and fungal spores on the aerial parts of the plant without damaging the orchid. Spray sunburned leaves to prevent secondary infections, spray leaf surfaces after prolonged rainfall to prevent rots, pour into phalaenopsis crowns to stop crown rot from progressing. Use it liberally whenever you see leaf discoloration, water pocketing, sunken spots, etc.

Drenches. Sometimes adding hydrogen peroxide to irrigation water is recommended as an easy way to increase the oxygen content in the root zone. When hydrogen peroxide is added to distilled water, it converts to water and molecular oxygen, the same compound that comprises 21% of the atmosphere, and this form of oxygen is great for the roots. But in the presence of organic matter or metal ions, reactive intermediate oxygen compounds (peroxyl, superoxide, hydroxyl radicals) may be formed and these are indiscriminate oxidizers. They will deactivate anything that is organic, microbes and fungal organisms (good and bad), plant tissue (living and dead) and organic matter (bark, peat or moss in your potting mixes). In fact, medical professionals no longer recommend hydrogen peroxide to sterilize wounds



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because it also destroys healthy tissue, although its effervescent cleansing actions are effective at debriding and removing necrotic tissue. If you choose to pour hydrogen peroxide through the root zone of your plants, you risk destroying the microorganisms growing in the rhizosphere, whether they are beneficial, benign or pathogenic.



3. This small rot spot did not spread after a few peroxide sprays. If only I had started spraying after the first few days of rain.



4. Spray hydrogen peroxide any place where water can pocket to kill omnipresent bacteria before they rot the plant crown or new growth.

If you know you have a pathogen like *Fusarium oxysporum* or *Rhizoctonia solani* infecting your roots, you may say “Bombs Away” and drench your potting mix with hydrogen peroxide. You are accepting the fact that you might kill the microflora, and then wait for the beneficial organisms to reestablish. If you have only one or a few orchids, perhaps a better alternative is simply repotting them into a fresh potting mix, discarding the contaminated mix and infected tissue rather than using a hydrogen peroxide drench. If you have a widespread problem, you might choose a fungicide with targeted effectiveness on the pathogen in question rather than a broad-spectrum peroxide drench.

After Repotting. Alan Koch of Gold Country Orchids has shared his technique of drenching pots with hydrogen peroxide after repotting to promote elongation and branching of the roots. There are scientific papers suggesting reactive oxygen species can increase lateral and adventitious root growth in some plant families, and there are reports promoting hydrogen peroxide applications to cuttings to prevent damping off and similar disease problems. If you spray the roots or drench your orchids with hydrogen peroxide after repotting into a fresh mix, you are probably not going to damage any rhizosphere populations except for those growing on or in your roots. Perhaps the hydrogen peroxide has the added benefit of sanitizing the wounds you inflicted on the roots during the repotting process, similar to cauterizing a wound. If you use biofungicides or probiotic products to help establish beneficial bacteria and fungi, apply them the day after hydrogen peroxide applications. If you use ProMix blends that contain mycorrhizae or biofungicides, spray the roots prior to repotting rather than drenching the potting mix.



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5. When Terry was replumbing the greenhouse water lines, he cut away an old section of pipe that containing a sticky, organic buildup on the inside of the PVC pipe. This deposit is a biofilm that develops inside irrigation lines, possibly exacerbated by the prior use of the pond behind the house for water.



6. This experiment to see how long it would take for the peroxide to lose its fizz was a failure; the balloon partially inflated after a week or two but the balloon degraded before the peroxide did.

Water Treatment. Hydrogen peroxide can be used to treat irrigation water to remove pathogenic organisms and biofilm accumulations. Hydroponic growers that recirculate irrigation waters and others using surface waters as an irrigation source may have to treat water to prevent disease in the growing area. The literature suggests around 150 ppm hydrogen peroxide (3.8 tsp/gal or 5 ml/l) is necessary to treat common water-borne pathogens like *Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia* (Fisher) and perhaps 400 ppm (10.2 tsp/gal or 13 ml/l) for virus (Runia). Hydrogen peroxide can be used as an oxidizing agent to clean an irrigation system of algae and organic buildup, after which a low dose can be applied continuously to keep the irrigation system clean. The dosage rate to destroy organic contaminants present in the water or water lines is dependent on your water quality. You want the majority of the hydrogen peroxide to be consumed in these reactions so less than 10-25 ppm reaches the roots. It is used as a sanitizer rather than as a way of supplying supplemental oxygen to your orchid roots.

Shelf Life. An unopened bottle of hydrogen peroxide has a shelf life of up to 3 years from the date of manufacture, as indicated by the expiration date on the bottle. Once the seal is broken and the peroxide exposed to air, warmth and light, the peroxide decomposes to water and oxygen gas at an accelerated rate. Under ideal storage conditions, you might have about 30 to 45 days of peak effectiveness and perhaps 6 months of useful activity. If you pour some on a cut and it no longer fizzes, it has lost its antiseptic qualities and the brown bottle contains only water. Mark the date you opened the bottle on the label, so you will know when to replace it. If you use the small spray bottles, get into the routine of pouring out unused solution and refilling the bottle on the first of every month.

Different Formulations. Hydrogen peroxide is produced in different strengths for various industrial applications up to 98% for rocket fuel, but highly concentrated solutions are hazardous to handle. BioSafe Systems makes activated

peracid products, like SaniDate and ZeroTol, that contain both hydrogen peroxide and acetic acid, producing a highly reactive product called peroxyacetic acid (PAA). This is more effective than hydrogen peroxide alone, but it also more dangerous to handle. These products cost well over \$100 for a 2.5 gal (9.5 l) jug and are probably more suitable for use by the commercial grower rather the typical hobbyist. Biosafe Disease Control, available in



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smaller quantities and lower concentrations (5.34% hydrogen peroxide and 1.36% peroxyacetic acid), may be of interest to home orchid growers.

Keep hydrogen peroxide in your growing area so it is right there when you need it. Spray it on the aerial parts of your plants the moment you notice any wounds, discolorations, sunken spots, areas where water pockets, anywhere that the plant tissue just does not look right. Use it liberally; the peroxide is not going to improve with age. The high priced fungicides have their place in your arsenal, but you cannot buy them at the Dollar Store. Hydrogen peroxide is cheap, effective and available, what's not to like!

Citations and Additional Reading:

Fisher, P. 2011. Water treatment: A grower's guide for nursery and greenhouse irrigation. *University of Florida, IFAS Extension*: Gainesville, FL. Website: www.WaterEducationAlliance.org

Li S.W., Xue L.G., Xu S.J., Feng H.Y. & An L.Z. 2007. Hydrogen peroxide involvement in formation and development of adventitious roots in cucumber. *Plant Growth Regulation* 52, 173–180.

Nederhoff, E. 2000. Hydrogen peroxide for cleaning irrigation system. *Commercial Grower*. 55: 32-34.

Nederhoff, E. 2002. Hydrogen peroxide-use in soilless cultures. *Vegfed's Greenhouse Vegetables Technical Leaflet No 9*. December 2002.

Runia, W. T. 1995. A review of possibilities for disinfection of recirculation water from soilless cultures. *Acta Horticulturae* 382: 221-229.

[Wageningen UR Greenhouse Horticulture](http://www.wur.nl/en/show/Air-humidity-Phalaenopsis-below-75-not-necessary.htm), Air humidity Phalaenopsis below 75% not necessary, <http://www.wur.nl/en/show/Air-humidity-Phalaenopsis-below-75-not-necessary.htm>

Zheng, Youbin, Siobhan Dunet and Diane Cayanan, Hydrogen Peroxide, Greenhouse and Nursery Water Treatment Information System, University of Guelph. <http://www.ces.uoguelph.ca/water/PATHOGEN/Hydrogen%20peroxide.docx>