



# St. Augustine Orchid Society

[www.staugorchidsociety.org](http://www.staugorchidsociety.org)

## Reverse Osmosis Water - Friend or Foe

by James Arnold, [jgroundskeeper@aol.com](mailto:jgroundskeeper@aol.com)

After a bite from the orchid bug in 2006 I rather quickly found the slipper orchids. Oh, I had others too but the Paphiopedilums and Phragmipediums were the favorites. After some plants died and others barely hanging by a thread, I became concerned that the chemicals added to the municipal water system was in part to blame.



1. The outside of James' 12 x 30 ft greenhouse



2. Inside the greenhouse

I decided in 2008 to have a well drilled. What could be better than water from Mother Earth? After a few months of using the well water, things became worse. Most of the plants stagnated and some died. I tried everything, more light, less light, different fertilizers. Nothing seemed to make much difference. One commercial grower I spoke with suggested that I send a sample of the well water for testing. After reviewing the results with a few commercial growers and a few fellow society members (a great source of information), it became obvious that the well water was less than desirable. The high alkalinity coupled with the sodium and chloride levels plus the high calcium content was not good for the slipper orchids.



3. 100 gallon per day RO unit

After some research I decided it was time for more drastic changes. With my greenhouse filling up with more and more expensive species and hybrids I could no longer just let them limp by on water of questionable quality. In 2010 I installed a 100 gallon per day reverse osmosis or RO system. It is a three-stage unit with a sediment filter, carbon filter, and the RO membrane. How does it work? Water is forced through the membrane with the help of a pressure boosting pump. The pump increases the pressure 10 to 15 psi, a must in the winter when the source water is colder slowing production. The membrane removes the solids that are dissolved in the water. Afterwards the water is less than 10 ppm or parts per million. The well water was of such poor quality that I was forced to use the municipal water source. This became a blessing in disguise because we had just recently had a water softener system installed. The water softener removes the calcium and magnesium minerals responsible for fouling the membrane. The

clean water is stored inside the greenhouse in a 100 gallon container used on farms for



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watering livestock. I cover the top with plywood to keep out the light and control algae growth. When watering I pump directly from the farm container with a 1/3 HP sump pump, 20 ft hose with a wand and low-pressure water breaker.

The reverse osmosis is very pure so fertilizing is a must. I feed at every watering with 15-5-15-5-2 Cal-Mag formula at 50 ppm nitrogen. The calcium and magnesium in the fertilizer are in the nitrate forms. They are readily available to the plants. Because the RO water has no buffering capacity, the pH of the water/fertilizer mix drops into the 3's, about the same as orange juice. I use a potassium silicate product that raises the pH back up to 5.5 or so. This also provides necessary silica to the plants that was removed from the source water by the RO system.

In the winter the water may need to be heated, even when storing the treated water in the greenhouse, which is kept at minimum 50 F temperature. I use two 30 gallon aquarium heaters to heat the water to 65 to 70 F. Cold water can shock plants and may slow or halt growth all together.

The pH of the media should be checked on a regular basis. High nitrate fertilizers may cause a rise in pH out of the desirable range of 5.4 to 6.2. I check a few plants each month with the pour thru method using steam distilled water. I simply water the plants well, wait about a half hour, then pour enough distilled water thru the media to get about an ounce. I then test this with a Blue Lab Combo meter for pH. It may be necessary to rotate in a more acidic reaction formula fertilizer to help maintain the pH in desired range.



4. 100 gallon container to hold the RO water

The RO system is not without its negatives. Storage of the RO water can be an issue. If not for the space taken up by the RO container, I could have another small table for seedlings. Waste is a concern; some units use four gallons of water to make one gallon of clean water, although the newer units may be more efficient. Water shortage could be problem in summer because the unit cannot meet the increased water requirements. Plan ahead, buy a bigger unit than you need. Collections tend to grow and so will the water consumption. Also remember that in the winter it takes longer to produce because of cooler water temperatures. The sediment and carbon filters should be changed on a three-stage unit every three months, at a cost of about \$15. The membrane can last up to five years, but I change mine every year, purchasing a replacement on Amazon for approximately \$25.



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Clean RO water has been good for my plants. With a few AOS awards, four of which are CCM's, I can't complain. Maybe coupled with dedication and attention to detail, RO water might be the answer to your water woes.