RESERVOIR & WATER **MANAGEMENT**

If you want your plants to excel, you will want to pay close attention to what is going on in your reservoir. By monitoring nutrients, not only can you feed your plants the appropriate level of nutrition, but you can also maximize the nutrients available for uptake. Monitoring insures against underfeeding or burning.

Order of Operations

It is very important that you follow these steps (in this order) when adding anything to your reservoir solution (nutrients, additives, etc.) Please note: whenever you add anything to a reservoir solution make sure that you adjust the pH last. Even if you just add water to a reservoir solution you still need to pH. There are certain exceptions to this order and it will be indicated on a given product label or set of instructions.

1. Start Out with Purified (Reverse Osmosis) Water. We recommend a UV filter be employed on any incoming water into your reservoir. This insures that the starting water is pathogen free.
2. You may want to Add MagiCal up to 150ppms. In the last 4 weeks of the Bloom stage you can add 0-50 ppms of MagiCal.
3. Add additives, one at a time, stirring well in between This includes anything that is not your main Nutrient.
4. Test ppms and see where you are at. You should only be at 37% (or just over 1/3) of overall desired ppms. (Ex. If desired ppms for given week are to be at 1500ppms then you will not want to have more than 550ppms with your additives added to your water solution (at this step.)
5. Add base nutrient (Examples of main nutrient: Heavy 16, PureBlend Pro, GH, SensiBloom or Grow, Any 3-Part Nutrient, etc.) as per directions (example: SensiBloom you add in equal parts A and B - If you add 100mL of A you will have to add 100 mL of B). Continue adding Nutrient until desired TDS is reached. (Ex. As in the previous example from step 3. The ppms after adding the additives were at 550. The desired ppms for that week are1500ppm. We now add 950 ppms of nutrient to the solution. CALL WITH QUESTIONS!
6. Adjust the pH of the Reservoir Solution.

If using a recirculating reservoir (which we do not recommend)

If using a recirculating reservoir, a good rule of thumb is to always top off your reservoir with fresh water without any nutrient added. You will lose some water through evaporation and plant uptake, but the strength of the solution doesn't drop with the level of the solution. Sometimes, as the reservoir water level drops the nutrient solution can become more concentrated. To avoid overdoing it, add only fresh water and then adjust your pH accordingly. The best way to know when its time to change your nutrient solution is to keep a record of how much water you're putting in the reservoir to top it off. When the amount added equals half of the reservoir capacity, it's time to change the solution and rinse the reservoir and growing medium. If you've got a 20 Gal res and over the course of 12 days you've added 10 Gal -- it's time to change your solution.

Cleaning and Sterilizing Equipment

Sterilizing equipment is extremely important and it is often handled incorrectly. Many people make the mistake of using Hydrogen Peroxide for sterilization. It happens to be a poor oxidizer, unable to kill many different types of pathogens, and is only truly effective at a pH of 2.0. A better choice is Bio-Green Clean, an excellent organic enzyme cleaner. It is especially good at cleaning those hard-to-clean white trays.

Bleach, although not the most environmentally friendly product, is an old favorite. It can kill anything, and is very cheap, making it hard to resist. Do NOT use it sparingly - Make a very concentrated solution. Let it soak for at least an hour, and let it run through all equipment (including pumps.) Scrub surfaces with a strong Bleach solution. Then make sure to do multiple rinses with plain water to rid the trays of any residual. When using strong bleach solutions, wear gloves & work in a ventilated area.

RESERVOIR & WATER **MANAGEMENT**

Water Temperature

Nothing works as well at controlling water temperatures as a water chiller. It is of critical importance for a healthy root zone that water temp stay at 66-68 deg. F. This does not mean that they can sometimes be between this temp zone and sometimes hotter or colder than this temperature. It is about consistently staying at 66-68 deg. F. At this temperature, the nutrient solution holds a good amount of oxygen within it, and the nutrient absorption rates are still high enough for most plants. See "Best Overall System Setup" info sheet for more info.

Reverse Osmosis "Purified" Water

Why would you drink purified water and not feed it to your prized plants as well? RO water is purified of all contaminants, minerals, and chlorine; effectively cleaning the life-blood of your plants vascular system. Coupling an RO water purification system like the Evolution or the Stealth 200 to a UV Filter System ensures that your water is fresh and clean and that it is also free of any pathogens. See "Best Overall System Setup" and "Why should you consider Reverse Osmosis" info sheets for more info on this topic.

Using Beneficial Biology to prevent Root Rot

There is a complex relationship between plants and the microbes that live in and make up the rhizosphere. As growers we want to inoculate and promote healthy microbe colonies. Some of the more common varieties to look for are Mychorizzae, Trichoderma, and Bascillus Subtillus. There are a plethora of products that help us in your endeavors, including Heavy Roots (the Best Protection Product we have), Roots Excellurator, Vermi-T, Piranha, Subculture, Tarantula, Voodoo Juice, and Insect Frass Mixtures, to name a few. We even brew our own concoctions. See "Beneficial Biology", "Best Overall System Intergration", and "Maintaining a Healthy Root Zone" info sheets as well.

Also Enzyme Solutions

Small, yet amazingly powerful -- enzymes have a variety of important benefits for the grower. There are many different enzymes that all have different functions. We are most concerned about two types of enzymes. There are those that accelerate sugar / resin production to create flavor and aroma. Then there are those that break down dying and dead plant proteins (dead leaves and roots) into their component parts – amino acids, lipids and smaller molecules which can be reabsorbed by the plant and the beneficial microbes. This also prevents those proteins from being food for pathogens. Some of the Enzyme solutions we like are Hygrozyme (for better, faster overall growth), Sensizyme, and Cannazyme.

The other route - Keeping a Reservoir Sterile

Some growers rely on "clean" growing environments, strong disinfectants and products that will sterilize the reservoir. This is harder than it sounds. Folks who have been growing in the same area for years might find that they are having root problems when they never had them before. Or a new grower might have them from the beginning. It can be tough to rid your area of pathogens once they have been introduced.

Zone: Comprised of monochloramine and essential oils know to ward off root disease. This is the strongest sterilizing agent that we sell. It is easy to use and works well at preventing root disease. Can be used at 2-3x strength to fight an infection. (Make sure to NOT add any beneficial microbes or enzyme solutions to the mix.)

Hydrogen Peroxide: Creates ozone in water, killing bacteria & adding oxygen to the system. Elevated levels of oxygen in water have proven to dramatically increase the speed of plant growth. Recommended (HIGH concentrations) for cleaning as well. (Make sure to NOT add any beneficial microbes or enzyme solutions to the mix.)

UV - Filter: Use of a UV Filter can greatly help win the battle against pathogens. As long as the nutrient solution is clear when it runs across the filter, (i.e. no organics,) all microorganisms DNA will be torn apart.

Please Note!! Both Zone And Hydrogen Peroxide Offer Protection And Benefits. But Neither Works Well With Beneficial Biology Or Enzymes Added To The Reservoir. Hydrogen Peroxide Doesn't Work Well With Anything Organic.

RESERVOIR & WATER **MANAGEMENT**

Irrigation Pump

An irrigation pump is used to pump water from the main reservoir to the Hydroponic / Soil Delivery / Drip system. Since there are so many brands and sizes of pumps to choose from, it can be quite hard to figure out the proper size pump for your given system. It is best to talk to us about it first. (Also note: All pumps are not created equal. Even though two pumps have the same GPH rating doesn't mean they will output at the same rate.) Make sure to ask a sales person about the differences.

Float valve or Float Switch

Float valves are a simple concept that can help insure a hydroponic system always has enough water. You'll notice the float valve is attached to the right side of the reservoir, with a water line coming in. At first glance a float valve might seem difficult to use and operate, but in truth the concept is easy and accessible. Float valves work in a similar way to a toilet. When the water level of the reservoir drops, it causes the float valve to drop with it, thereby opening up the pathway for water to flow into the reservoir. When the reservoir is filled up again, the float valve rises back up with the water and closes off the pathway, thus restricting water from passing through. Float valves can be used to connect one reservoir to another, or they can be connected directly to a water filtration system directly such as The Merlin Garden Pro or the Stealth 200. In between the float valve and the incoming water line we like to put a ball valve (giving you more control of when the water is flowing into your reservoir.) We can help - Talk to us about installing a float valve. It is actually cheap and easy! This provides for automated water filling. We also believe in employing a slightly more sophisticated float - called a float switch; involving a watering timer. Inquire within!

Aeration within the water leads to More Aeration at the Root Zone

Most reservoirs need to include some form of aeration. Oxygen is very important for healthy roots and aerated water provides bonus oxygen. We suggest using either an air pump, air stone or venturi, or a combination of all three. None of these is depicted in the picture above. The other types of systems will need extra oxygen, depending on the type of growing media used. We suggest the biggest Air Pumps you can find! It should be bubbling like a hot tub!

Draining a reservoir with the help of a "Drain Pump"

Since draining the reservoir is a regular event (about once a week.) We suggest using a separate Drain Pump. This pump should ideally suck from the bottom in order to assure complete and thorough drainage. Examples of Good Drain Pumps are - PE-1 or NK-1 for Smaller Reservoirs, or the 1-ABS for mid size reservoirs (less than 100 gallons) or Vertygo for larger reservoirs (more than 100 gallons).

Nutrient and pH control

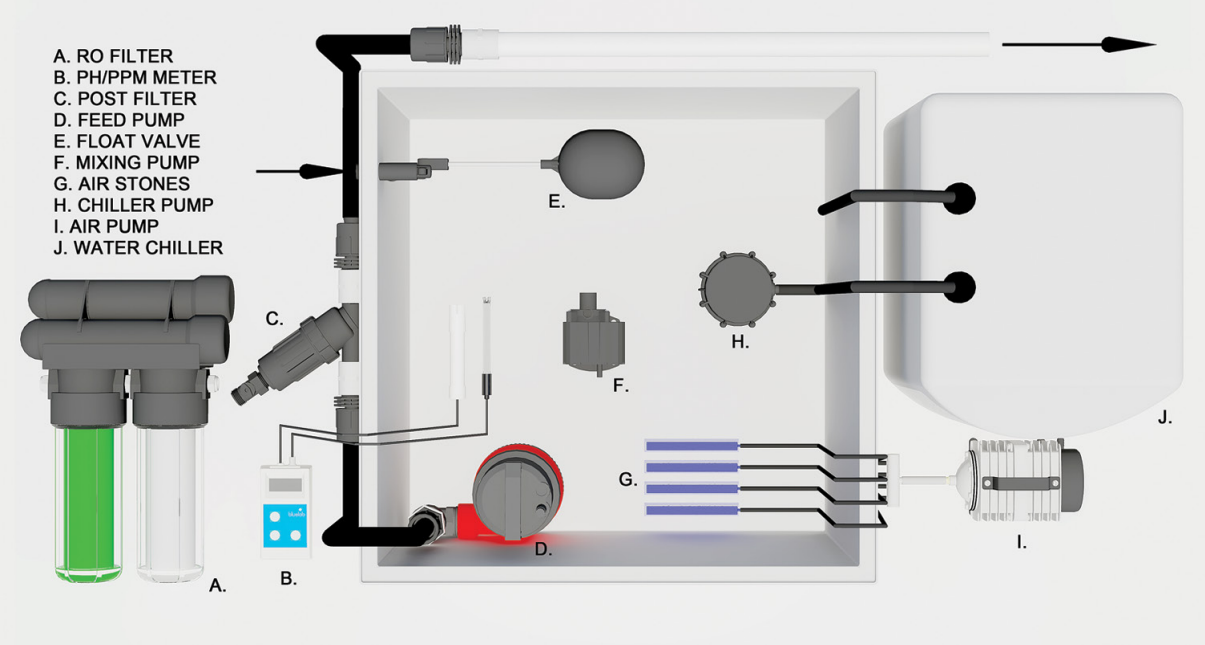
Although not depicted in the diagram (page 4) , a good reservoir setup will always include a continuous pH / TDS / Water Temp monitor such as the GrowCheck TriMeter from Hanna or the Blue Lab Guardian. This meter will continuously display the pH and ppms of the nutrient solution, allowing for greater control. Water Temp is also very important to have a handle on. We suggest the use of a water chiller. (page 4). For more automated control, check out the IntelliDose or MiniDoser from Am. Hydroponics. It will monitor and control pH and ppm values at ALL times.

Keeping your Reservoir Temperatures Cool through the use of a Water Chiller

A water chiller is one of the most over-looked and most needed component to a healthy reservoir. A water chiller assembly employs a submersible pump to move water through the chiller and back into the reservoir solution. Chillers can be set up to have a differential so that they are not always running. Ideal water temperature is between 66-69 deg. F. The chiller will bring the water down to 66 deg. F. and then turn off until the water is up to 68 deg. F. (We like EcoPlus Industrials or Artica Chillers over any other because they are well made, more durable and longer-lasting.)

Please find two examples of Water Management Systems, and the Parts they use, on the back of this page.

RESERVOIR & WATER MANAGEMENT



On top - A diagram of a simple Reservoir and Water Management setup.
Below - A more complex Reservoir / Water Management example.