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Dosing Procedures for Nutrients and Additives

Nutrient performance is far more complex than simply using a quality brand. Although growers typically blame the nutrient for poor plant performance, the failure to follow basic dosing procedures is the cause of many problems.

Step 1.

Volume of nutrient solution: As a guide, allocate at least 2.5 gallons of nutrient solution per large plant (e.g. tomato), or around a ½ gallon for smaller plants (e.g. lettuce).

This is especially important for re-circulating systems because larger nutrient volumes will undergo smaller changes in concentration (EC) and pH. In hot weather, insufficient nutrient volume could result in EC soaring to toxic levels, which could seriously damage your plants. Larger nutrient volumes will also reduce how frequently top-up water is needed.

Step 2.

Dosage rates: The dose rate depends upon your growing medium (soil, expanded clay, etc) and the phase of growth – seedling, vegetative or flowering. Refer to the manufacturer's dosage chart.

Step 3.

Add the majority of water before adding nutrients and additives: Never mix nutrients and additives together in small amounts of water.

With two and three-part nutrients, the "parts" are kept separate for good reason. When these parts are mixed together in concentrated form (or in too little water), a white precipitate will form – as is often seen in nutrient reservoirs (*Figure 3.6b and 3.1*).

Step 4.

Thoroughly stir the nutrient: Always stir immediately after adding each nutrient and additive (or even top-up water). This eliminates regions where less soluble nutrient species are concentrated. It also removes regions of extreme pH (either high or low), thereby preventing the destabilization of nutrients that are unstable outside of the pH window of 5.0 to 6.5.

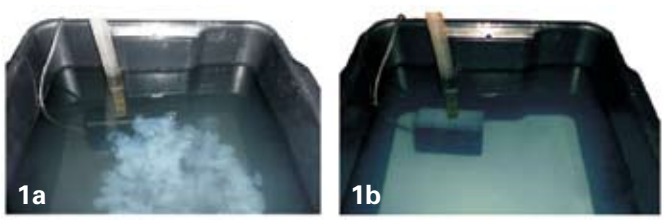

Figure 1a and 1b
This is what can happen when an undiluted, high pH additive is added to the working nutrient solution (see 1a). Unless pH is quickly corrected to below 6.0 - 6.5 the precipitate will remain (see 1b). A similar result can also be expected when other dosing techniques are not followed.

Step 5.

pH control: Do not leave pH unchecked for a long period of time. Quickly add all nutrients and additives then, after thorough mixing, immediately check pH and adjust if necessary. Allowing pH to rise above 6.5 is a common cause of white precipitate in nutrient reservoirs.

Step 6.

Maintaining nutrient concentration: (Does not apply to 'run-to-waste' systems). As plants grow they simultaneously remove both water and nutrients from the nutrient solution. This may cause the nutrient strength to either increase or decrease – depending on which is being consumed at the faster rate. Typically the nutrient concentration tends to increase, especially in hot weather because water loss can be excessive due to both plant uptake and evaporation. Therefore, ensure the water level is kept relatively constant. When this is done, the concentration or conductivity (EC) will be relatively predictable. (Concentration will slowly decrease as the plants consume nutrients). Check the EC about every second or third day and if necessary add sufficient nutrient to stay within the target range.

Step 7. Further notes:

NOTE:
High salinity (salty) make-up water may cause EC to increase.

Figure 2
A white precipitate forms when the separate 'parts' of a two or three part are combined in too little water.

"Avoid "roughly measuring" out the nutrient dose - always add the correct amount of each part."

Beware of high pH additives: The best dosing technique to adopt with additives that increase pH significantly (silica, PK additives) is to add them to the water and adjust the pH down to 6.0 prior to adding the nutrient.

The less preferred but simplest alternative is to pre-dilute the additive in a separate volume of raw water. Then once this solution is added to the nutrient solution, quickly lower the pH to below 6.5. Note: A white cloudy precipitate (calcium sulphate) may form where the pre-diluted additive initially merges with the nutrient solution. However, because the initial particle size of the precipitate is small, it will usually re-dissolve if the pH is immediately re-adjusted (Figure 1a).

Two and three part nutrients: Avoid "roughly measuring" out the nutrient dose - always add the correct amount of each part. In the case of a two part, 'under' dosing part 'B' for example, could cause a deficiency in over half the nutrients required (i.e. P, K, S and all of the trace elements - except iron).