USING WATER SOLUBLE FERTILIZERS

Water Soluble Fertilizers (WSF) are a great source of nutrients to use for growing indoor hydroponic crops. Hawthorne's WSF products, such as General Hydroponics® FloraPro®, are fertilizer blends produced from high quality, technical grade fertilizer salts in dry, powder form. WSF's are meant to be dissolved, or solubilized, in water before use. Historically, indoor hydroponic growers relied on liquid fertilizer products. For those growers who have always used liquids and want to use WSFs in their production, there are a few things that need to be kept in mind when using Hawthrone, WSF products.

1. DISSOLVING WSF FERTILIZERS MAY BE A NEW EXPERIENCE FOR SOME GROWERS.

Growers can use WSF products to make a ready-to-use dilute solutions or to make a concentrated solution for further dilution.

Starting Tips

- Water quality is important. Reverse Osmosis (RO) water is preferred but not required. If not using RO water and using an outside source, it's best to have a water analysis conducted by a reputable lab to assure there are no contaminants that will interact with your fertilizer program.
- Use hot water if possible. Dissolving fertilizer salts is an endothermic process. That means that dissolving any fertilizer salt will need energy (i.e. stirring or heat) **to make the process go faster**. When making either dilute or concentrated solutions, starting with hot water and agitation, speeds up the process up considerably. The speed in which a fertilizer dissolves is driven by the amount to be dissolved, the temperature of the water used and the amount of agitation employed.

PREPARING READY-TO-USE DILUTE SOLUTIONS DIRECTLY FROM THE PRODUCT.

Growers will either make small amounts for use (i.e. a few gallons) or possibly large amounts (i.e thousands of gallons)

- Weigh the product out accurately and place the fertilizer in an appropriate container
- Add about 70% of the volume needed for the dilution. Use hot water if possible.
- With agitation, add the measured amount of fertilizer. Using a paddle mixer or other appropriate agitation method is helpful. Once the fertilizer is dissolved, add enough cold water to achieve the final volume.
- Refer to Hawthorne's feed charts for the correct rate to use for your crop stage.
- For small volumes, you may not be able to accurately weigh out the amount needed. In this case, it may be better to prepare a concentrated nutrient solution first, then diluting the concentrate to arrive at the final dilution that goes onto the crop.
- For large volumes, bear in mind that the final volume needed can be adjusted to accommodate our 25 lb bags so that weighing the fertilizer is not necessary - Finished volumes can be prepared for the number of 25 bags needed.

2. MAKING CONCENTRATED SOLUTIONS FOR FURTHER DILUTION.

A common practice growers employ is to prepare a concentrated fertilizer and use fertilizer injectors or proportioners, to dilute the fertilizer into the irrigation system. The amount of fertilizer that should be used to make the concentrate is typically dictated by the injection ratio. As injection ratios increase (i.e. 1:100 to 1:200 to 1:300, etc) more fertilizer is required in the concentrate (i.e. more concentrated) to achieve a certain diluted concentration. When considering this, bear in mind that most WSF products have a maximum solubility limit (MSL) and is expressed as pounds/gallon or grams/liter. Hawthorne provides this information on our technical data sheets. Trying to dissolve more fertilizer than the MSL value will not work. Keep in mind that you can always use a lower injection ratio to achieve a target finished concentration if necessary.

- Fill the stock tank 70% with water, preferably warm or hot water and add the required amount (by weight) of fertilizer, with agitation, while adding fertilizer
- Once the desired weight of fertilizer has been added continue agitation while adding the required amount of cold water to reach the intended final stock solution volume. When the solution is ready to use when the solutions are clear and homogeneous in appearance.

- If accurate weighing is not an option, you may consider solubilizing entier 25 lb bags and adjust the volume of the stock solution as necessary.
- Assure there is adequate mixing of fertilizer and water before going on the crop. Most fertilizer injector companies provide guidance to achieve this aspect.
- To assure you are diluting the fertilizer stock solution properly, it's a good idea to make a small diluted sample by the concentrate by hand and check the concentration.
- We recommend staying within 80% of the maximum solubility limit to eliminate issues.

3. STABILITY OF FERTILIZER SOLUTIONS.

Once a concentrated or finished solution is made, you do not have to continuously agitate the solution. However, you may want to agitate the solution briefly before further dilution for the ultimate in uniformity. Water quality may play a role in the quality of finished nutrient solutions over time. Most hydroponic growers use reverse osmosis water (RO). However, growers who use well water or surface waters may have issues from microorganisms using nutrients for their growth particularly when storing dilute solutions. With that being said, we recommend using finished, ready-to-use nutrient solutions soon after preparation. Concentrated solutions may be stored longer. We recommended using concentrates within one month after preparation assuring the concentrate is protected from direct sunlight and sealed (or covered) to prevent water evaporation.

4. STORING WSF PRODUCTS.

WSF products do not spoil or go bad. As long as the unused product is kept cool, dry and out of direct sunlight, and sealed in original packaging, these products will last indefinitely. However, we recommend that products kept in inventory be rotated on a first in first out (FIFO) basis. Using any product soon after manufacture is always the best policy. This will limit any product that will harden or cake. A WSF product may become caked in the bag typically because of external environment, ripped or torn bags or the nature of the high analysis ingredients. Opened bags should be closed tightly and stored in air-tight containers to prevent caking. If caking should occur, it does not mean the product is not fit for use on the crop – the product can still be dissolved, ideally with hot water, and used without issue. Some products, as a result of their targeted formula, can be more challenging in this regard and it's worthwhile to make extra effort to store products in a cool, dry place out of direct sunlight.

5. COMPATIBILITY.

Mixing some water soluble fertilizers, in concentrated form, may lead to precipitation of certain nutrient elements. Concentrated solutions containing calcium cannot be mixed with a concentrate containing sulfate sulfur. Any concentrated fertilizer solution containing calcium cannot be mixed with a concentrate containing phosphate, except if the solution is highly acidic - Which in most cases it is not. This is why many fertilization procedures / systems use at least a two part or two tank system. These nutrient elements are compatible in dilute solutions that you would apply to a crop. When storing dilute solutions following combination of various parts, you may notice some slight precipitation. But this is typically not a significant issue. As mentioned previously, dilute, ready-to-use nutrient solutions are best applied soon after preparation.

6. COMPATIBILITY AND MIXING WSF WITH OTHER PRODUCTS.

Sometimes growers wish to mix two products together in concentrated form to simplify and streamline operations. As a general rule, we do not advocate mixing WSF products in concentrated form with other products. If you wish to mix Hawthorne fertilizer products in concentrated form, please call Hawthorne Technical Services and Support for advice. We do not recommend mixing Hawthorne products in concentrated form with non-Hawthorne products. Regardless, it is alway best to conduct a 'jar test' with any anticipated ingredients before large scale adoption and use.