



**GENERAL
HYDROPONICS®**

FLORAPRO™

CALCIUM + MICROS • GROW • BLOOM



USAGE GUIDE

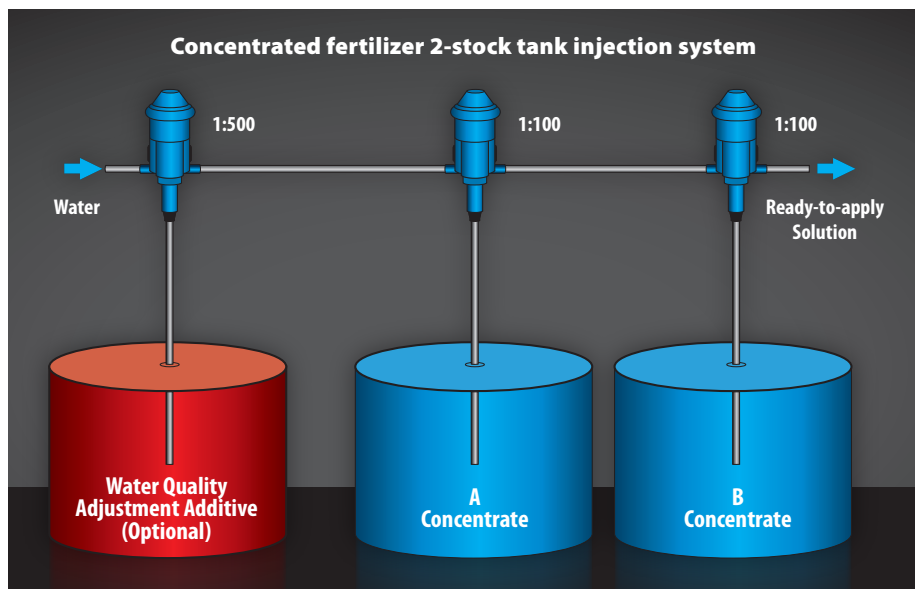
WATER-SOLUBLE FERTILIZERS FOR COMMERCIAL GROWERS



HOW TO USE FLORAPRO™

The FloraPro™ system is easy-to-use and efficient for the commercial production of a wide range of indoor-and greenhouse-grown plants, including commercial cannabis production. As a two-component system (also known as an A/B system), it is made up of two parts: a calcium-containing fertilizer containing micronutrients (we call it A, part A, tank A or Ca+Micros) and an NPK plus Magnesium component (we call it B, part B, tank B or NPK). This two-part system provides robust and effective nutrient delivery to plants.

FIGURE 1.
SCHEMATIC OF A TWO-PART OR “A/B” FERTILIZER INJECTION SYSTEM



STEP ONE

START BY CHOOSING ONE OF TWO CALCIUM + MICROS OR PART A FORMULATIONS

To do this, you need to know the alkalinity (or hardness) of your water.

Assume an alkalinity of between 0-10 if you are using RO water.

Many well waters will have alkalinities above 120 ppm CaCO_3 .

For water alkalinity BELOW 120 ppm CaCO_3 :

use FloraPro™ Calcium + Micros.



CALCIUM + MICROS

Total alkalinity < 120 ppm

CaCO_3 equivalent

For water with an alkalinity ABOVE 120 ppm CaCO_3 :

use FloraPro™ Hardwater Calcium + Micros.



CALCIUM + MICROS HARDWATER

Total alkalinity > 120 ppm

CaCO_3 equivalent

STEP TWO

AFTER CHOOSING YOUR PART A FORMULATION...

Choose the part B formulation based on the crop stage: vegetative or flowering.

For the vegetative stage, use our FloraPro Grow formulation.

When in flowering, use FloraPro Bloom.

Use during vegetative stage:



GROW

Use during flowering stage:



BLOOM

TABLE 1.
QUICK GUIDE FOR USING FLORAPRO™ FERTILIZERS BASED ON WATER QUALITY AND CROP STAGE

Total Alkalinity* (ppm CaCO ₃)	Growth Stage	Part A or Cal-Mike Component		Part B or NPK Component	
		FloraPro™ Calcium + Micros	FloraPro™ Calcium + Micros HW	FloraPro™ Grow	FloraPro™ Bloom
< 120	Vegetative	X		X	
	Flowering	X			X
> 120	Vegetative		X	X	
	Flowering		X		X

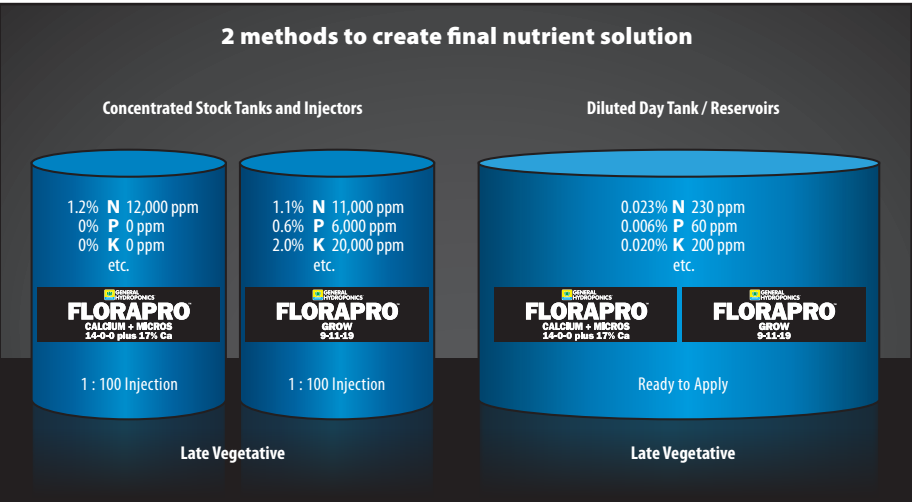
* Total alkalinity is a measurement of a water’s ability to change pH, or change the pH of a substrate. In most instances, it is closely associated with the content of calcium and magnesium. As the alkalinity increases, adjustments to the amount of additional calcium and/or magnesium provided may be necessary.

HOW TO DISSOLVE FLORAPRO™ FERTILIZERS FOR COMMERCIAL USE

FloraPro, by virtue of being a water soluble fertilizer, is concentrated and must be diluted in water. It can be diluted into the irrigation water manually, by employing a “day tank” system, or by using fertilizer injectors or chemical dosing systems.

FIGURE 2.
GRAPHIC REPRESENTATION SHOWING THE CONCENTRATION OF FERTILIZER WHEN PREPARING FLORAPRO CONCENTRATED STOCK SOLUTIONS.

For further dilution to a Day Tank nutrient solution or directly into the irrigation system using fertilizer injectors





FOR FERTILIZER INJECTION SYSTEMS

Fertilizer injection systems dilute **concentrated** stock solutions into irrigation water at a set rate (or dilution ratio) during the irrigation process for convenient fertilization of crops. Use the information in Tables 3 and 4 to confirm how much FloraPro™ fertilizer to dissolve per liter of stock solution to achieve a desired final nutrient concentration.

A note on measuring concentration

You will note that concentration in our charts is expressed in ppm Nitrogen (N). This is because traditionally, most water soluble fertilizers are used in this way, given that nitrogen is the key nutrient driving plant growth. However, we also cross-reference the ppm N level to the theoretical conductivity level of that solution, expressed as mS/cm and PPM (using the 500 ppm NaCl standard). This is to help the grower easily verify the concentration of the solution made, regardless of the conductivity meter used.

Important storage information

Please be advised that each FloraPro fertilizer (i.e. Base and Grow or Bloom) **MUST** be diluted with water separately and kept in separate stock tanks for use with direct-injection systems. Refer to Figure 1 for a standard FloraPro injection configuration. Failure to store each fertilizer separately will result in nutrient precipitation, which may clog or damage irrigation equipment.

The great thing about a two-part (or two-tank) system is that either component can be adjusted to meet the needs of your crop.

HOW TO PREPARE A STOCK SOLUTION

1. In clean stock tank, use fresh water to fill roughly to 70% of desired volume. RO water is preferable but not required. Hot water will greatly speed up the dissolution process. Fertilizer salts will decrease solution temperature.
2. We recommend using a paddle mixer or equivalent mixer to agitate stock tank while adding FloraPro™ fertilizer.
3. Slowly add the specified amount (weight or number of bags) of FloraPro fertilizer for the targeted stock solution volume to achieve your desired diluted concentration.
4. Once the desired mass of FloraPro fertilizer has been added, fill the stock tank with water to reach the final targeted stock solution volume.
5. Stock solution will be ready to use once solution is clear and homogeneous in appearance.
6. Time required to fully dissolve will vary depending on water quality, temperature and agitation.
7. The stock solution does not need to be agitated once FloraPro is solubilized, although agitation during injection will provide the ultimate in uniformity. Agitation can be done by using a mechanical device or a submersible air or water pump (protect submersible pumps from corrosion).

TIPS AND TRICKS WHEN PREPARING STOCK SOLUTIONS

- RO water is preferable but not required.
- Hot water will greatly speed up the dissolution process.
- We recommend using a paddle mixer or equivalent mixer to agitate stock tank while adding FloraPro fertilizer.
- It is always a good idea to dilute a small, ready-to-use sample with the stock solution. This helps ensure the FloraPro stock solution has been correctly diluted.
- Hint: Bags are 11.3 kg (25 lbs). For those without the means to weigh a large amount of fertilizer, use this measurement to make stock solution based on the number of bags needed.
- Keep in mind the solubility limits of each FloraPro fertilizer. We recommend never exceeding 80% of the max solubility of each fertilizer. The more concentrated the fertilizer, the longer it takes to fully dissolve when preparing the stock solution.



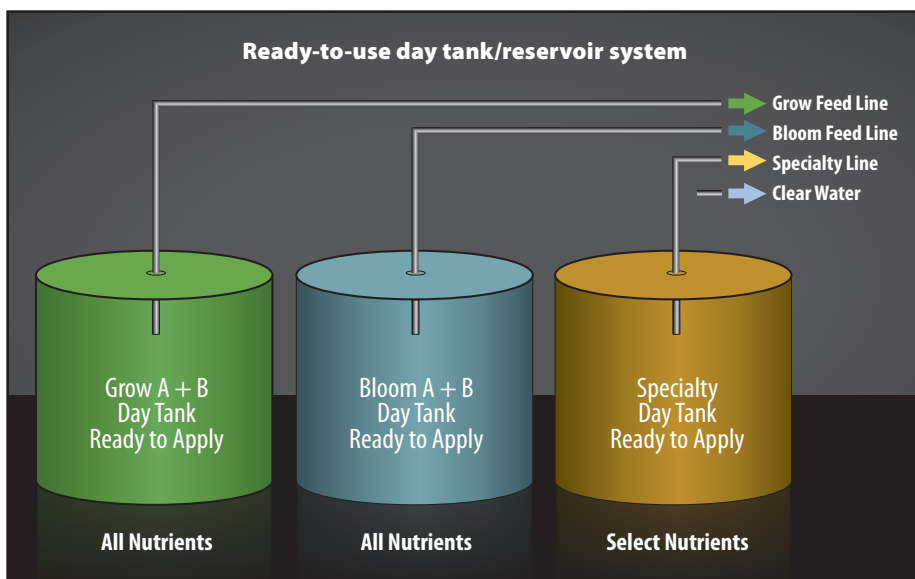
FOR DAY TANKS/RESERVOIR DILUTION

Some operators prepare a diluted, ready-to-use nutrient solution, which is often contained in large tanks for direct application to the crop. We call a ready-to-use, diluted nutrient tank a “day tank.”

Growers can prepare day tank solutions using FloraPro™ in one of two ways:

1. FloraPro fertilizers can be added right away to make the final solution volume for day tanks. When doing so, use the instructions found in Tables 3 and 4.
2. Or, FloraPro can first be dissolved to make a concentrated fertilizer solution. We call this concentrated liquid fertilizer solution a stock solution. A stock solution can be prepared first, then manually diluted to achieve that nutrient solution concentration in a day tank. You must know the desired final concentration and the necessary dilution to meet that final concentration.

FIGURE 3.



For day tank dilutions, simply divide lb values by 100.

TABLE 2.
SOLUBILITY LIMIT OF FLORAPRO™ FERTILIZERS

Fertilizer Product	Solubility Limit	
	(grams/liter of water)	(lbs/gallon of water)
FloraPro™ Grow	420	3.5
FloraPro™ Bloom	420	3.5
FloraPro™ Calcium + Micros	540	4.5
FloraPro™ HW Calcium + Micros	480	4.0

TABLE 3.
FLORAPRO USE CHART FOR WATER ALKALINITIES AT 120 PPM CaCO₃ OR BELOW.

Final Nutrient Solution Qualities		Grow (18h photoperiod)		Bloom (12h photoperiod)	
		Early Growth	Late Growth	Early Bloom	Mid Bloom
Total Nitrogen (ppm)		120	180	150	130
EC range (mS/cm)		1.1-1.4	1.7-2.0	1.6-1.9	1.5-1.8
PPM range (500 ppm scale)		500-700	800-1000	750-950	700-900
FloraPro™ Formula	Stock Tank	Pounds of FloraPro per 100 gallons of concentrated stock solution using a 1:100 injection ratio			
FloraPro™ Calcium + Micros	A	35.3 lb	54.7 lb	54.7 lb	40.0 lb
FloraPro™ Grow	B	50.0 lb	76.7 lb	0.0 kg	0.0 lb
FloraPro™ Bloom	B	0.0 lb	0.0 lb	73.3 lb	80.0 lb

For day tank dilutions, simply divide lb values by 100.



TABLE 4.
FLORAPRO™ USE CHART FOR WATER ALKALINITIES ABOVE 120 PPM CaCO_3 .

Final Nutrient Solution Qualities		Grow (18h photoperiod)		Bloom (12h photoperiod)	
		Early Growth	Late Growth	Early Bloom	Mid Bloom
Total Nitrogen (ppm)		80	160	128	120
EC range (mS/cm)		0.6-1.0	1.4-1.8	1.4-1.8	1.3-1.7
PPM range (500 ppm scale)		300-500	700-800	700-800	650-850
FloraPro™ Formula	Stock Tank	Pounds of FloraPro per 100 gallons of concentrated stock solution using a 1:100 injection ratio			
FloraPro™ HW Calcium + Micros	A	20.7 lb	41.3 lb	41.3 lb	33.3 lb
FloraPro™ Grow	B	38.0 lb	76.0 lb	0.0 lb	0.0 lb
FloraPro™ Bloom	B	0.0 lb	0.0 lb	82.0 lb	82.0 lb

RECOMMENDED SPECIALTY NUTRIENTS

General Hydroponics® manufactures other nutritional products that may be used in combination with a FloraPro™ program. Table 5 lists the various products available, along with their recommended rates of application. Refer to the products' specific labelling directions for further information. For additional support or information, contact Hawthorne Technical Support or Professional Technical Services.

TABLE 5.
GENERAL HYDROPONICS® SPECIALITY NUTRIENT PRODUCTS

General Hydroponics Specialty Nutrient	Application Rate		Appropriate Growth Stage	Purpose
	(ml/L)	(ml/ gallon)		
Rapid Start®	0.25-0.5	1-2	Propagation through early flower	Encourage root hair formation and root branching
Floralicious Plus®	0.25-0.5	1-2.5	Vegetative through late flower	Improves flower quality, oil production and aroma
CaliMagic®	0.65-1.3	2.5-5	As needed	Corrects calcium and magnesium deficiencies
Armor Si®	0.25-0.65	1-2.5	Vegetative through late flower stages	Strengthens and protects plant body from various stressors
Liquid Koolbloom®	0.25-0.65	1-2.5	Early to late flower	Promotes flower bulking and increases floral yields
Ripen™	0.7-1.3	2.5-5	Late flower through ripen stages	Promotes flower ripening and flower quality

FLORAPRO STORAGE RECOMMENDATIONS

FloraPro is a blend of high-quality mineral salts, and is made with internal good management practices to achieve excellent quality standards. To maintain excellent quality, store as follows:

- Store fertilizer in a cool, dry place out of direct sunlight.
- Avoid high temperatures or high humidity to prevent fertilizer from liquifying or clumping.
- Product is hygroscopic: substance tends to absorb moisture from the air. Opened bags should be closed tightly and stored in airtight containers to prevent hardening.

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WATER-SOLUBLE FERTILIZERS FOR COMMERCIAL GROWERS

FLORAPRO™

CALCIUM + MICROS • GROW • BLOOM



HAWTHORNE GARDENING™
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The Hawthorne Gardening Company, 3204 NW 38th Circle, Vancouver, WA 98660
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