

FloraMaX

BRINGING QUALITY BACK



GROWERS GUIDE

NUTRIENT SYSTEM FOR COMMERCIAL CROPPING



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 @floramaxnutrients

Analytical Chemists and Horticultural Consultants Since 1966



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How to Make Cuttings

- 1. Make nutrient solution:** Refer to 'Cuttings' phase on the FloraMax Dose Chart.
- 2. Add substrate to pots then water** thoroughly with the nutrient solution. Allow to drain well.
- 3. Take cuttings:** Select a healthy mother plant that is not flowering:

- **Step i. Take cuttings from "semi-hard"** material. Ideal length is 3 - 5 inches with two spare leaves at the base for removal during Step ii (Fig 5.1).

- **Step ii. Remove lower set of leaves** flush with stem (Fig 5.2). Then about 1/4 inch below this, cut through the stem on a 45-degree angle. Use a sharp and sterile blade and do not tear or crush the stem.

- **Step iii. Dip 1-inch of base of cutting** into FloraMax Cloner (Fig 5.3). Then gently insert stem about 1-inch deep into a slightly undersized hole in the centre of the pot (Fig 5.4). *Do these steps quickly to minimize stresses on the cutting.*

- 4. Place a clear propagator lid over the cuttings** and close vents (Fig 5.5). Relative humidity should be maintained about 90% (open vents slightly if required). To promote root growth and combat wilting, spray 1-3 times per day with a solution of FloraMax Cloner Spray.

- 5. Place under low intensity fluorescent light** (or equivalent). Leave on for 24 hours a day. Monitor temperature inside the propagator. Aim for 75-80 deg F (24-27 deg C). Use a 'heat mat' if temperatures are too cold. Raise lights if too hot.

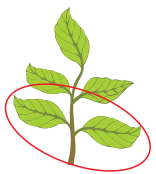


Fig 5.1 Cuttings need "spare" leaves at the base

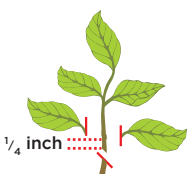


Fig 5.2 Where to cut



Fig 5.3 Dip cutting in FloraMax Cloner



Fig 5.4 Insert base of cutting into substrate

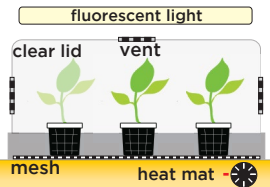


Fig 5.5 Propagation units help improve the speed of cuttings.

- 6. Check cuttings regularly.** Once roots form (typically 5 - 10 days) the substrate needs to be fed more regularly with nutrient solution. Note how heavy plants feel once fed and do not refeed if they still feel heavy.

TIP: Top-feeding can fail to feed the entire root-zone. Full immersion of the pots can be more effective.

- 7. Humidity and disease:** Vents can be gradually opened over a few days once roots have formed. This will help prevent diseases and prepare the freshly rooted cuttings for lower humidity. Also, keep hard surfaces clean and dry, and remove any dead plant matter.

- 8. Air-pruning:** Placing the pots on "mesh" to raise them slightly off the bottom of the tray, kills any roots that try to grow outside of the pot. This promotes a better root structure within the actual substrate (Fig 6.1).



FloraMax Cloner Spray produces explosive root growth. P.B., Detroit MI



Fig 6.3 Never transplant until roots have colonized the substrate

Transition to Veg Phase

Avoid stressing plants by sudden changes in humidity, temperature, light and nutrient concentration.

Are plants ready for transplanting?

- 1. Ensure there are plenty of air pruned roots** on the outside of the pot and check that roots have colonized the substrate (Fig 6.3).

- 2. Test the cuttings capacity to withstand the humidity and temperature** used in the vegetative phase. Test for an hour or two to begin with.

Keys for transplanting

- 1. Choose the right pot size.**

Transplanting to an over-sized pot will discourage roots from searching for water. Use an intermediate sized pot and give the roots time to fully colonize the

substrate BEFORE replanting into a larger pot (Fig 6.2).

2. Ensure that the new substrate is flushed and watered with fresh nutrient solution. Refer to Veg week-1 on the FloraMax Dose Chart.



Fig 6.1 Use mesh to ventilate and 'air prune' cuttings.

3. Be careful changing from fluorecent to powerful HID (or LED) lighting as plants may become stressed. Lift the lights to a 'safe' height.

Veg Phase (Veg)

Creating the right environment is essential for promoting a short, stocky plant. This is the ideal shape for indoor growing:

- 1. Use lights** with "blue-rich" spectrum and day length of 18 hours.
- 2. Root-XS, OrganaBud and Growth-XS** will ensure optimum root and structural growth.



FloraMax Root-XS: Root growth over 8-days. @h2ohydroponics, USA

3. Avoid "stretch" by positioning plants close to the light.

4. Topping and Low Stress Training (LST) should be done during veg to maximize the number of bud sites and ensure all foliage receives enough light.

5. Humidity and temperature: Maintain 50-70% "RH" and day ("lights-on") temperatures of 68-82 deg F (20-27 deg C). At "night" do NOT allow the temperature to drop by more than 9 deg F (5 deg C).

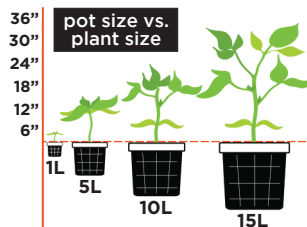


Fig 6.2 Pot size is key for enabling roots to fully colonize the medium.



Growth-XS: Major impact within 7-days. Suncoast Hydro, Australia

6. Pest management: Insects can be prevented from entering the system by filtering the air supply. Use a magnifying glass to regularly inspect the roots, substrate and both sides of leaves (Fig 11.2). "Yellow sticky traps" are useful as a forewarning.

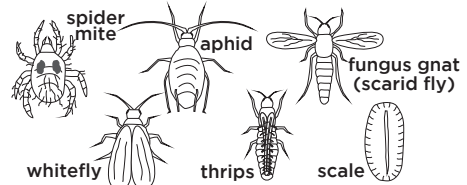


Fig 11.2 Insects spread disease and destroy foliage

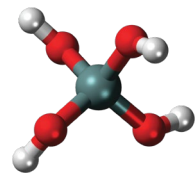
Veg to Bloom

Plants begin budding when switched to at least 12 hours of uninterrupted darkness each night ("12/12"). This must continue until harvest.

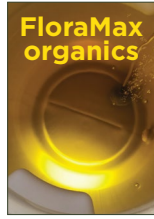
When to switch to bloom?

There are 2 main considerations:

- **Strong root system:** Cuttings usually need at least 2-3 weeks in veg. "Seedlings" need 6-8 weeks. Growth-XS will accelerate veg and prevent stalled growth.
- **Height of plant:** Plants will typically double in size during flowering. So, if 'room' height is



FloraMax Silica contains Monosilicic Acid. This is readily absorbed by plants to prevent leaf wilt and improve stem rigidity.



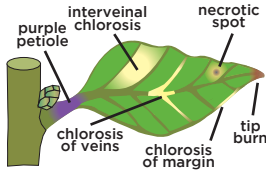
Organic additives are usually very messy (L). **FloraMax OrganoBud 0-0-2** runs extremely clean (R) and produces more bud sites, stacking and weight.

limited, switch to 12/12 before the plant has reached 50% of the 'available' height.

Bloom Phase

1. Refer to 'Bloom' phase on the FloraMax Dose Chart. Resin-XS, OrganoBud and Flowering Enhancer are key for maximizing yield and quality.

2. Switch lights off for 12 hours per day. If interrupted, flowering will be hindered, and plants may revert to veg.



FloraMax Ca-Mg-Fe prevents nutrient deficiency symptoms.

3. Increase the air-exchange rate. Gradually lower relative humidity to around 40-60%. This helps avoid rot and mildew, and improves CO2 levels.

4. General optimum "daytime" temperature is 68-82 deg F (20-27 deg C).

5. To avoid stretch and maximize yields:

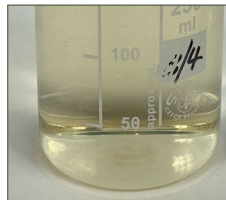
i. At "night" do not allow the temperature to drop by more than 9 deg F (5 deg C).



Rapid veg growth **without a cal-mag** or any nitrogen supplements. @hydropacific, USA



Thick stems. **No cal-mag.** @55hydro, USA



FloraMax feed **AFTER 8-months.** pH 6.3, EC 2.6. @floramaxlab



Fig 3.4 Use a light meter to test if lamp output is adequate.

ii. Keep plants as close as possible to the lamps without causing burning.

iii. Avoid shading by having too many plants.

iv. FloraMax Silica will help stems carry fruit weight.

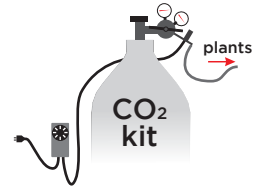


Fig 7.1 CO2 injection can improve growth rates.

6. Avoid stressing plants by pruning during flowering. Major structural pruning should be done during veg.

Topping & LST

When growing indoors, higher yields are obtained by training plants into a low, wide and flat canopy. This promotes more flowering sites and positions them in the zone of optimum light intensity (Fig 8.1).

STEP 1. Topping

When and how to 'top'?

Topping is best done when the plant is less than 2-3 weeks old and has only 2-5 nodes in total. Topping is the removal of the plant's 'top' growth just above a node (Fig 8.2). Once topped, the two axillary buds immediately below the cut will form two new branches.

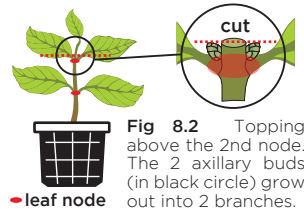


Fig 8.2 Topping above the 2nd node. The 2 axillary buds (in black circle) grow out into 2 branches.

Once these new branches develop 1 or 2 leaf sets, they can be topped again (Fig 8.3a). This second round of topping will form four even-sized branches (Fig 8.3b).

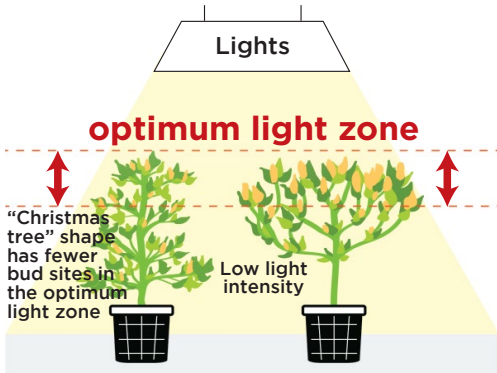


Fig 8.1 Topping and LST positions more bud sites in the optimum light zone

Important points for topping

1. Topping can be done more than twice however doing so will increase time in vegetative phase.

2. Healthy plants usually take 2-3 days to recover from topping. Never top during flowering as it causes too much stress.

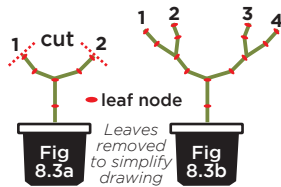


Fig 8.3a A second round of topping will grow out to form 4 even branches (**Fig 8.3b**).

STEP 2. Low Stress Training (LST)

After topping twice, there are four quality branches growing vertically from what was originally the top node (**Fig 8.3b**). LST involves pulling these branches downwards until horizontal and outwards into a "star" configuration (**Fig 8.4**).

Important points for LST

1. When to start and finish LST? LST should be started as soon as possible during the vegetative phase. Flowering phase can commence once all major branches are horizontal and level with each other. LST should continue during early flowering as vegetative growth continues. Aim to maintain a flat, level branch structure.

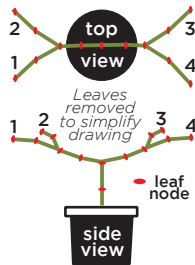
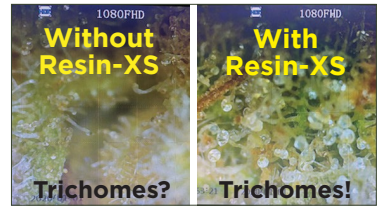


Fig 8.4 LST applied to plant in **Fig 8.3b**



FloraMax Resin-XS has an huge impact on trichome size, resin and oil.

2. Bending branches: Young growth is easier to bend than older growth. Do not rush to get branches horizontal, do this in stages. When a branch is first bent, growth will be slowed. LST again once it grows another 3 inches or so.

Foliar Spraying

Foliar sprays are useful for delivering fertilizers, fungicides and pesticides to plants.

1. A wetting agent (or "wetter") should be added to foliar spray solutions. This increases the sprays capacity to "wet" and penetrate foliage. **NOTE:** FloraMax Clone Spray has an inbuilt wetting agent - NEVER add more.

2. Test-spray a small patch of leaves and observe for at least 2 weeks.

3. The best time to spray is usually about 1 hour before "daylight".

4. Avoid spraying when air temperature is above 25°C (77°F) as absorption is usually poor.

5. Spray a 'fine' mist. Drenching foliage can restrict the stomata's ability to absorb. A fine mist will achieve maximum surface coverage, especially on the underside of leaves where the majority of stomata are located.

6. Spray when wind is minimal - to avoid waste. **7. Use low salinity/ soft water.** This will reduce the risk of leaf staining and burning.

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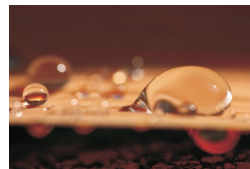


Fig 14.2. Without wetting agents, foliar sprays remain as large droplets. This restricts their absorption.

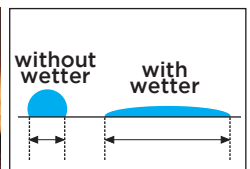


Fig 14.3. Wetting agents lower the surface tension of the foliar spray solution so that the droplet collapses and covers a larger area.

Nutrient Management

1. Water quality

Reverse osmosis (RO) or rainwater are ideal because they contain no harmful salts and will not impact pH or EC. Any water stored for more than 2-3 days should be dosed with Pythoff PLUS (0.5ml/L every 7-days), then stored in the dark for at least 24 hours prior to use.

2. Add nutrient and additives

Follow the FloraMax Dose Chart: Use the recommended additives to achieve the recommended EC and optimum yield and quality.

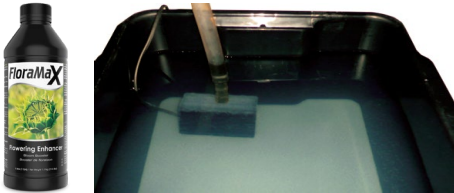


Fig 9.1. Nutrient reservoir with pH above 7: Calcium, sulfate, iron and other trace elements can precipitate in the reservoir and become unavailable for root uptake. **FloraMax Flowering Enhancer** helps "lock" pH below 6.5 and avoids needing a cal-mag.

3. Check pH is 5.0 to 6.3

- **How to measure pH:** Use an electronic meter or liquid test kit. Ensure the nutrient is well stirred before measuring pH.
- **Target pH:** If the pH tends to rise, reduce it to 5.0-5.5. This provides a larger pH safety margin than, for example, 6.0, and minimizes the amount of pH maintenance.
- **Hard and alkaline waters:** Avoid using recirculating systems. Nutrient will be more stable if pH is quickly lowered to 5.0 - 5.5 (Fig 9.1).
- **Adjusting pH:** Add a small amount of pH Down / pH Up. Then stir well and recheck pH. Always predilute pH adjusters with water prior to adding. For raising pH, it can be easier and safer to use FloraMax SILICA 0.1-0.3ml/L.
- **Recirculating systems:** Check pH daily, or after the addition of top-up water.
- **Minimizing pH fluctuation:** For recirculating systems, supply at least 10 litres of nutrient for each large plant.
- **pH electrodes:** Calibrate regularly using *both* pH Buffer 4.0 and 7.0. The electrode must be rinsed with distilled water after use. When not being used, soak the electrode's tip in an electrode storage solution. Do NOT use pH buffers or distilled water.

4. Nutrient concentration

This can be checked using an EC (or TDS/ppm)

Table 10.1 Target EC / ppm

	Cuttings	Veg	Bloom
EC (mS/cm)	0.8 - 1.0	1.4 - 2.0	2.0 - 2.6
500ppm-Hanna	400 - 500	700 - 1000	1000 - 1300
640ppm-Eutech	512 - 640	896 - 1280	1280 - 1664
700ppm-Truncheon	560 - 700	980 - 1400	1400 - 1820

meter. Burning of roots or foliage can occur if the EC is too high. If the EC is too low, deficiency symptoms can occur (see Table 10.1).

- **The recommended EC:** This value is on the 'regular' FloraMax Dose Chart and varies throughout veg and bloom. If a "ppm" meter is being used and the specified EC is 2.1mS, the "2.1mS" will need to be converted to ppm using Table 10.2. For example, on a Hanna-500ppm meter, 2.1mS is equivalent to 1,050ppm.

- **How to check and adjust EC:** Once the nutrient and additives are added to the reservoir, stir thoroughly then immerse the electrode. Allow the meter to stabilize before recording the reading. If the EC is below target, add extra Veg-1 or VegaFlora AB until the target is reached. If the EC is too high, add some water then recheck.

CAUTION: Do not use EC unless the meter is regularly checked with a 2.76mS calibration solution.

- **Hard / salty water:** Hard or salty water will elevate EC and add nuisance salts to the nutrient solution. This can harm plants. To compensate, follow the FloraMax 'hard water' chart. If the 'regular' chart is used with, for example 0.5mS water, the EC will be 0.5mS higher than expected and may contain unwanted levels of certain salts.

- **DWC or sensitive plants:** Use the FloraMax 'hard water' chart. This provides safer EC levels.

Table 10.2. EC to TDS Conversions

mS (mS/cm)	CF	Hanna 500ppm	Eutech 640ppm	Truncheon 700ppm
0.7	7	350	448	490
0.8	8	400	512	560
0.9	9	450	576	630
1.0	10	500	640	700
1.1	11	550	704	770
1.2	12	600	768	840
1.3	13	650	832	910
1.4	14	700	896	980
1.5	15	750	960	1050
1.6	16	800	1024	1120
1.7	17	850	1088	1190
1.8	18	900	1152	1260
1.9	19	950	1216	1330
2.0	20	1000	1280	1400
2.1	21	1050	1344	1470
2.2	22	1100	1408	1540
2.3	23	1150	1472	1610
2.4	24	1200	1536	1680
2.5	25	1250	1600	1750

5. Feeding frequency

Feed requirements will depend on factors such as stage of growth, substrate, air temperature and humidity. Always water sufficiently to ensure the entire root zone is fed and flushed (Fig 2.1).

NFT (no media): Provide 10-20 feeds per hour during daylight, then feed less at night.

Perlite, Vermiculite, Expanded Clay: Generally feed every 1-3 hours during daylight, then less at night.

Soil / Coco Coir / Rockwool: Over-watering can cause oxygen starvation, pest invasion and diseases.

i. Feed times: Begin feeds at the start of daylight and cease at least 2 hours before night.

ii. Feed volume: Feeds should produce 10-20% run-off out the bottom of the pot i.e. Collect 10-20ml for every 100ml of feed. This helps ensure the root-zone is fed and flushed.

iii. Feed frequency: Generally, feed once per day. Note how heavy plants feel when watered then feed if they feel light. It is common to feed several times per day from about veg week-3. This will maximize yields and prevent deficiencies.

6. Nutrient stability

Poor growth is often due to the failure to treat the nutrient solution. FloraMax Pythoff PLUS and System Maintenance are ideal for this (Fig 11.3) as they are fully compatible with FloraMax additives – *NOTE, chlorines and hydrogen peroxide can destroy the organics!*

Cover the reservoir to prevent evaporation and light exposure (Fig 13.4). Light can destroy organic additives and accelerates the growth of slimes and pathogens. Avoid using an aerator in run-to-waste systems.

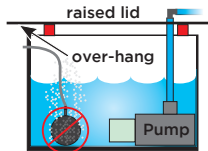


Fig 13.4 For maximum nutrient stability, avoid using an air stone and install a raised lid on the reservoir.

7. 'Recirculating' systems

• **Check water level, EC and pH daily:** Keep the reservoir topped up with water. Do not allow EC to drop more than 20% - maintain by adding Veg-1 or VegaFlora AB. Maintain pH 5.0 - 6.3.

• **Replace nutrient every 7-14 days:** EC readings will not warn if the nutrient is imbalanced therefore



Fig 11.3 Pythoff PLUS helps prevent root browning.

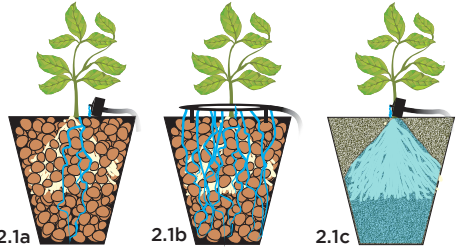


Fig 2.1a Roots are often underfed when plants are top-fed. This can be avoided by delivering nutrient at multiple points, **Fig 2.1b**, AND by using a finer substrate such as perlite, Rockwool, coco or soil - **Fig 2.1c**

it must be replaced regularly.

8. Weekly root zone flush

Flushing removes salt build-up and dirt from the root zone, substrate and feed circuit. Inspect filters and drippers prior to making fresh nutrient as these can become blocked during flushing.

• **Recirculating systems:** Flush immediately after the nutrient is discarded. Firstly, remove any obvious build-up then partly fill reservoir with water. Add 0.5ml/L Pythoff PLUS and ensure pH 5.0 - 6.0. Operate the pump to flush the root zone, substrate and feed circuit. Discard the waste, then repeat with plain water.

• **Run-to-waste systems:** Generally flush every 1-2 weeks, or weekly if water quality is poor. Partly fill reservoir with water. Add 0.5ml/L Pythoff PLUS and ensure pH 5.0 - 6.0. Operate the nutrient pump until the run-off is within 0.5mS of the input water.

9. Nutrient temperature

The nutrient solution and root zone should be kept between 20-25 deg C (68-77 deg F). Hot nutrient will promote root diseases and cold nutrient will slow plant metabolism.

10. Post harvest clean-up

This helps prevent diseases in the next crop:

• **Step 1.** Remove plants and non-recyclable substrate then do as much manual cleaning as possible.

• **Step 2.** Partly fill the reservoir with water. Ensure pH 5 - 6. Add Pythoff PLUS at 2-4ml/L and mix well. Ensure good ventilation and low light.

• **Step 3.** Run the pump at least once every hour over a 24-hour period. 'Flooding' may be necessary to contact hidden surfaces.

• **Step 4.** Discard this solution then flush several times with fresh water to remove excess Pythoff PLUS. Drippers may need to be dismantled and cleaned.

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FloraMaX

Your harvest is our priority

For Commercial Growers

Veg-1 & VegaFlora A+B *Base Nutrients for Hydro/Coco/Soil*



1. ONE formula for veg and bloom.
2. No "cal-mag" required, even with coco and RO.
3. Industry-leading pH-buffering.
4. Fewer blockages and longer reservoir stability.
5. Powdered version is fully soluble.

Flowering Enhancer *PK + Cal-Mag-Iron + pH stabilizer*



1. "PK": Establishes the baseline PK levels for bloom.
2. Cal-mag + iron: Prevents deficiencies and bud rot.
3. Helps maintain pH below 6.5. pH maintenance is rarely required in coco and soil.

Root-XS *Organic root accelerant*



1. Faster root development.
2. Minimizes transplant stress and stall.
3. No biofilms, pH fluctuation or blockages.

OrganaBud *Organic enhancer for structure and quality*



1. Promotes branching, shortening, bud-sites and stacking.
2. Increases potency, terpene profile and pistil vibrancy.
3. No biofilms, pH fluctuation or blockages.

Resin-XS *Organic resin & oil enhancer*



1. Increases frosting, resin, oil and potency.
2. Improves swell, density and final mass.
3. Replaces PK additives, bloom boosters and "finishers".
4. No biofilms, pH fluctuation or blockages.

Growth-XS *Organic veg accelerant*



1. Helps halve veg phase duration when applied in veg week-1. This lowers running costs and enables an extra crop each year.
2. Prevents transplant shock and stall.
3. No internodal stretch, biofilms, pH fluctuation or blockages.

Pythoff PLUS *Eliminates toxic buildups*



1. Nutrient solutions: Prevents root browning, pests and blockages.
2. 'Weekly' flush: Restores the rootzone and substrate.
3. Stored water (e.g. RO): Keeps water free of toxins.
4. Post harvest cleanup: Cleans hardware and substrate.

Silica *Monosilicic Acid - Improves stress resistance*



1. Contains silica as monosilicic acid. 100% bio-available.
2. Fully soluble - no blockages or deposits.
3. Highly concentrated and stable - 10-year shelf-life.

Ca-Mg-Fe *Cal-Mag-Iron plus Cu-Mn-Zn-Mo-B*



Contains cal-mag PLUS iron, copper, manganese, zinc, molybdenum and boron. This is necessary because most deficiencies are caused by one or more of these 8 elements, not just cal-mag!

System Maintenance *Organic preventative for biofilms*



Prevents the growth of biofilms in nutrient solutions. Compatible with organic additives, beneficial bacteria, enzymes and mycorrhiza.

Clone Spray *Organic foliar spray*



1. Promotes rapid root development in cuttings.
2. Prevents transplant stress, wilting and deficiencies.
3. Absorption is optimized via foliar specific ingredients and plant-specific wetting agents.