Hydropak

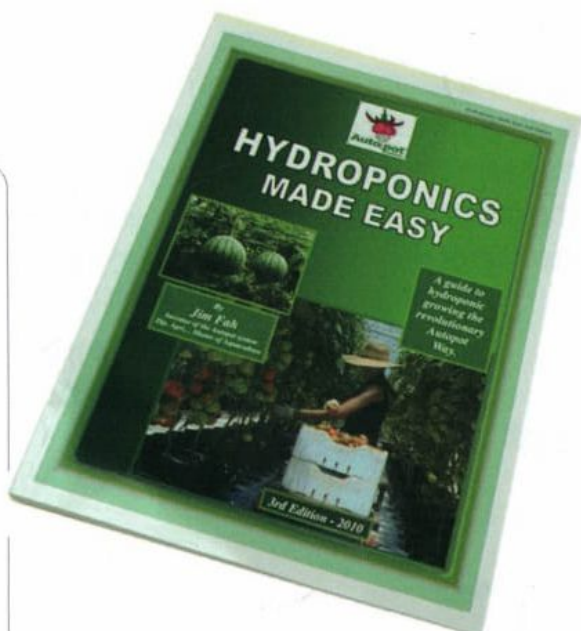
Operating instructions

To explore more topics on growing with AutoPot, grab a copy of the inventor's book;

"Hydroponics Made Easy" was written in response to the many requests from users of AutoPot Systems.

This book describes why AutoPot Systems is so different to conventional hydroponics.

For a detailed guide on how to get the best out of your setup, this book is a comprehensive reference for growing with AutoPot!.



CHECK THE CONTENTS OF YOUR KIT;

The Hydropak Kit consists of the following items:-

- 1 x Hydrotray Double 10" tray and lid.
- 1 x Smart-valve.
- 2 x 10inch/250 mm squat pots.
- 2 x Marix root control mats.
- 2 x bags of 5 litre perlite/ vermiculite mix.
- 1 pair of 1L A & B AutoPot nutrients.
- 2m of 4mm tubing.
- 2 x 4mm taps.
- 1 x in-line filter.
- 1 x 30L Hydrotank with Lid and grommet.
- 1 x instruction booklet.

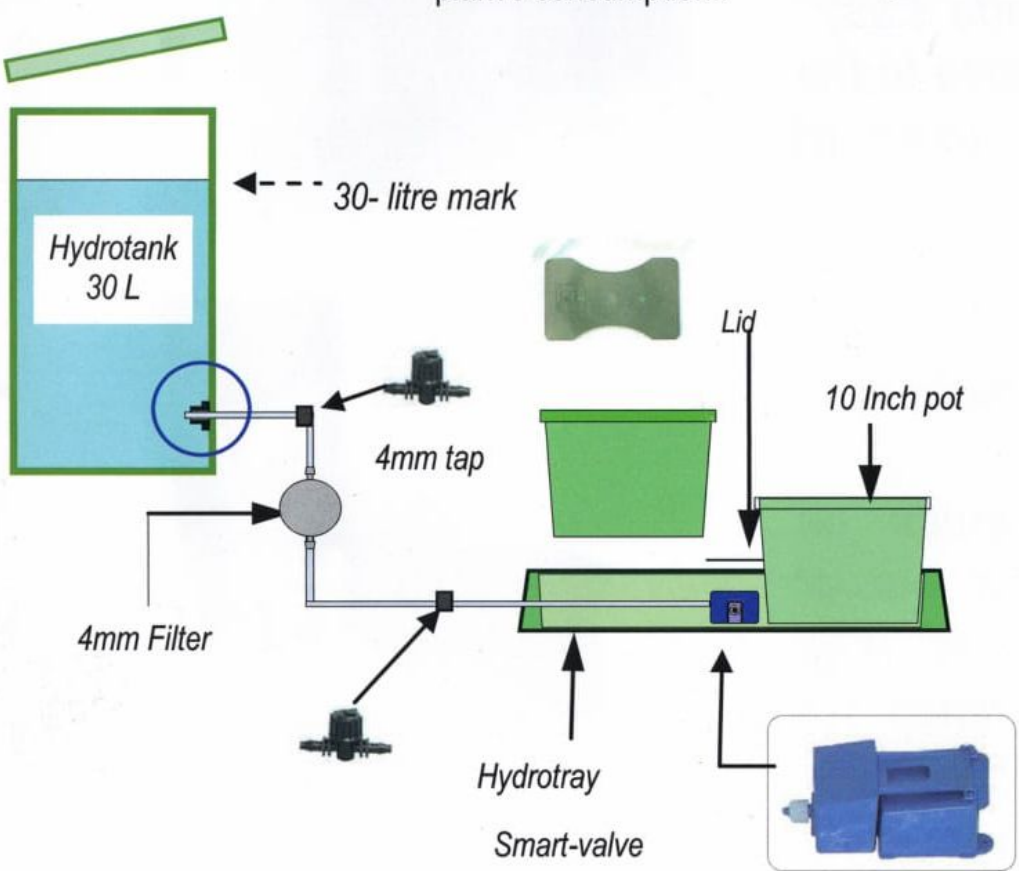
Setting Up The Hydropak Kit

Connect up the system as shown in the diagram below. Place the tank half a meter or higher than the growing module. The higher the better.

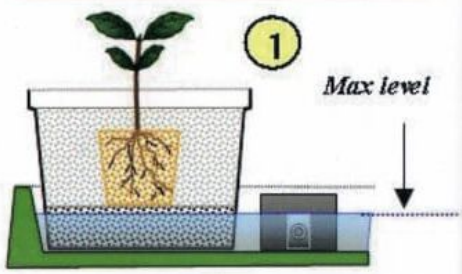
How does the Smart-valve work?

The Smart-valve is the heart of AutoPot Systems. It is small enough to fit on the palm of your hand. Its appearance is simple but its performance is incredible. Being simple enables it to be practical to have one valve for each individual container and this is the very crux of the system's versatility. It'is different from a conventional ball cock float valve because it allows total reduction of the fluid level before it refills. To be able to perform such tasks automatically without any electrical component is truly unique.

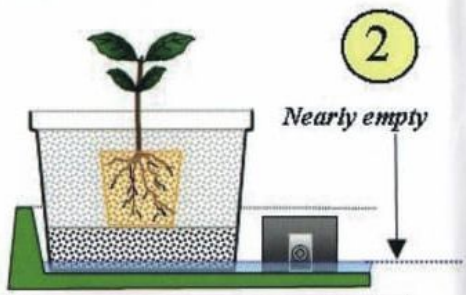
When connected to a low pressure water supply (gravity tank or a pressure pump) the Smart-valve opens to allow water to flow and fill the bottom of the growing container to a pre-determined depth (about 30 mm). The Smart-valve then closes thereby shutting off the water supply from the tank. The plants intake the water by absorption through capillary action that occurs within the growing medium. Once the water has been used to the extent that the film of water under the valve has gone, the Smart-valve re-opens and allows another supply of water to enter the Hydrotray. This concludes one wet and dry watering cycle - all driven by the plant's consumption!.



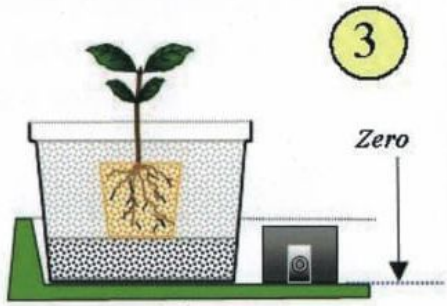
Wet and Dry Cycle



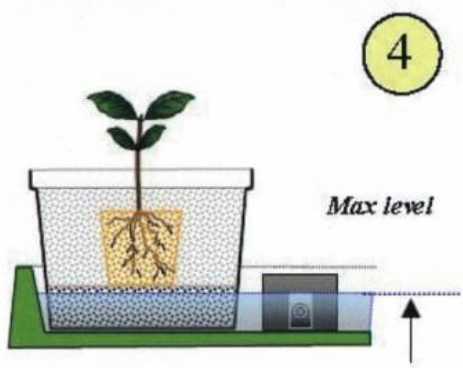
The tray starts to empty and the Smart–valve opens to let nutrient solution into the tray to a pre-set level of about 30mm.



Water level in the tray drops as nutrient solution is consumed by the plant. The tray is nearly empty but the Smart-valve still remain closed.



The tray is now completely empty. It will take time before the Smart-valve re-opens to let in more nutrient solution.



The Smart-valve will close once the pre-set level of about 30 mm is reached again and this completes one wet and dry watering cycle

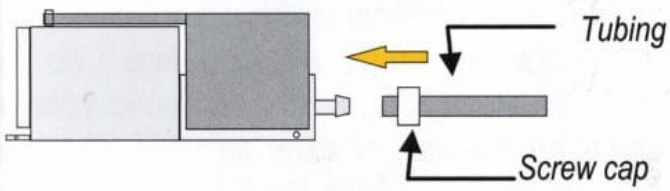
STEP BY STEP INSTALLATION

1. Positioning the tray

Keep the tray level . The system can be located under cover or outdoors. Most plants will prefer full sunlight.

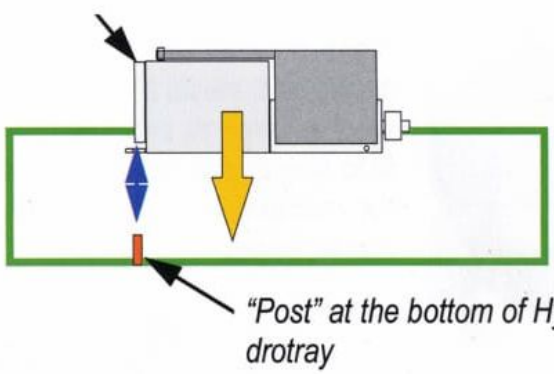
2. Installing the Smart-valve

(a) Connect the 4mm tubing to the Smart-valve with the screw cap. Use one end of the 4mm tubing provided. There is only one connection to be made to the Smart-valve.

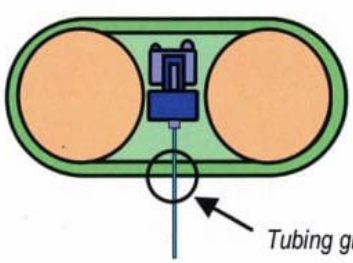


(b) Set the Smart-valve onto the valve compartment of the Hydrotray and secure it firmly to the post at the base of the tray as shown below.

Semi-circular column at the back of the Smart-valve



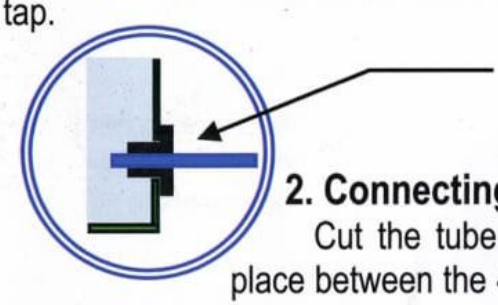
Make sure that the opening of the semi-circular column at the back of the Smart-valve is aligned directly over the post/protrusion of the Hydrotray as shown above. Then push the valve firmly downwards until it is securely locked in to position.



CONNECTING THE TANK TO THE TRAY

1. Positioning the tank

Ideally, the tank should be placed 4 to 5 feet higher than the tray. In practice, it should be at a height convenient for refilling. Push the free end of the tubing through the hole in the grommet attached at the bottom of the Hydrotank. Use of a lubricant (eg Vaseline) is advisable. Now connect the 4mm tap.



2. Connecting to the filter

Cut the tube at a convenient place between the 4mm tap and the tray and push fit the in-line filter. The filter works in either direction so it can be connected to either end.

PREPARING THE NUTRIENTS

Follow the instructions on the labels of the nutrient bottles. For standard mix - 5ml of part A and 5ml of part B nutrients per litre of water (or 150ml of each into 30 litres of water).

The best way to fill the tank is with a 10-litre bucket or watering can. Add into the bucket of water 50ml of part A and 50ml of part B nutrients. 3 buckets of the solution will fill the 30L tank to the maximum level as marked. Using a bucket of known volume makes it easier for topping up the tank as this will ensure that the nutrient strength is always right.

The addition of organic nutrients into the tank is not recommended as it tends to clog up the system.

CAUTION – *DO NOT MIX PART A AND PART B NUTRIENTS UNDILUTED TOGETHER. AS THIS WILL CAUSE A REACTION TO TAKE PLACE CAUSING A PRECIPITATE, RENDERING THE NUTRIENT UNUSABLE.*

For best results, use AutoPot nutrients.

FILLING THE POTS

Pots that come with the kit have narrow slits as drainage holes. First, insert the Marix root control mat to the bottom of the pot before filling it with the growing medium (perlite/vermiculite works well).

The use of other types of pots are not recommended as they tend to have large drainage holes which allow media to get through. This can cause problems with blockages for the Smart-valve.

Marix root control mat to sit at the bottom of the pot.

PLANTING

First, saturate the growing medium in the pots with 1 litre of nutrient solution drained from the tank.

Make a hole in the media and plant as deep as you can. If the seedlings are small, use half the amount of perlite/vermiculite and then plant. Back fill later as the plant grows larger.

With AutoPot Systems, there is no need to remove potting mix from the roots of the seedlings before planting. They will recover faster as this minimises root damage. The nutrient solution will not be affected by the presence of potting mix in the growing medium simply because AutoPot Systems are non-recycling.

After completion of planting, replace the lid on the tray and push fit securely. .

GROWING MEDIA

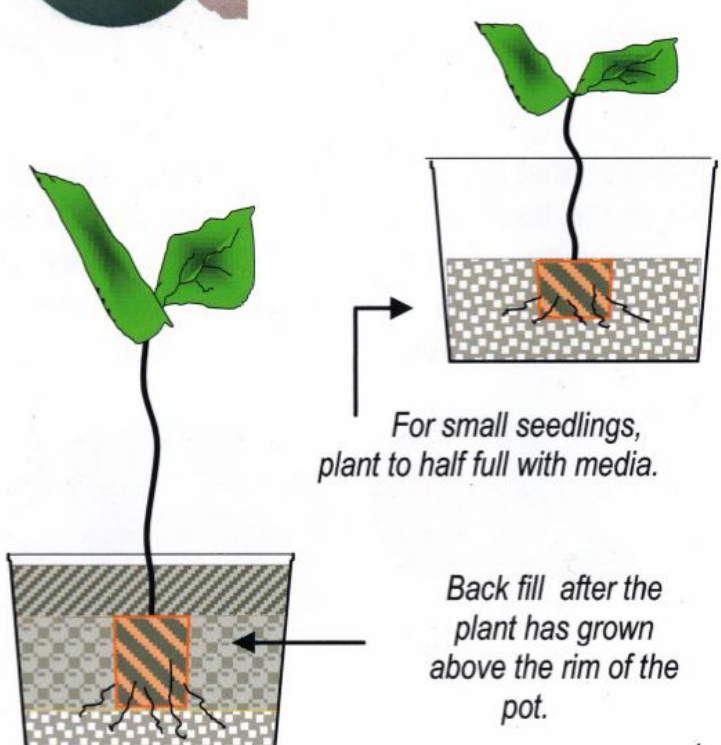
Most plants will grow in an amazing variety of media. There will be certain types of media that is more ideal for certain varieties and conditions, however, consider what you can get locally... if you are installing hydroponics on a desert island and you have little chance of importing media, what do you do? Most desert islands have three possible media. Coral, sand and coconut fiber. You can use them individually or have them mixed in different proportions. As an example, we had a commercial grower in Western Samoa using coral sand in AutoPot Systems to good effect.

AutoPot Systems can use a wide range of media. In its truest hydroponics application, inert media is used. However, due to its unique action, the system can also use totally organic material as well. In all recirculating hydroponics systems, the idea of mixing inert media with potting mix or allowing organic material like animal manure into the medium goes right against the accepted rules. In AutoPot Systems there are even cases where this is an advantage. For instance, a tray system that is out in the open will benefit from a surface dressing of organic fertiliser to counteract the diluting effect of rainwater on nutrient. It is logical to use whatever local material that is available.

One question we should ask ourselves : do we really need to go soilless for the academic sake of hydroponics? We do not think so. Use whatever material (preferably available locally) that gives you the best results.

Removing the root ball from the pot. Unlike conventional hydroponics systems, you do not need to wash the soil away from the roots of the plant.

Place the root ball into the pot and backfill with media to the top . Try to plant as deep as possible. The idea is to ensure that the roots are within the moisture zone in the lower portion of the pot.

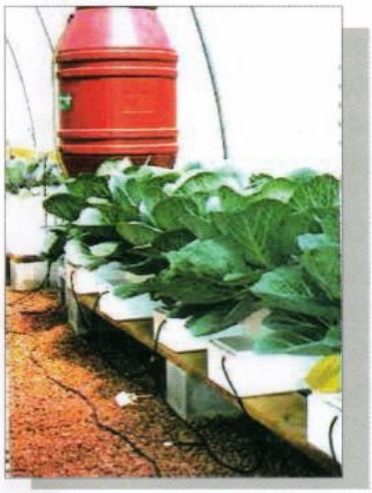


For small seedlings, plant to half full with media.

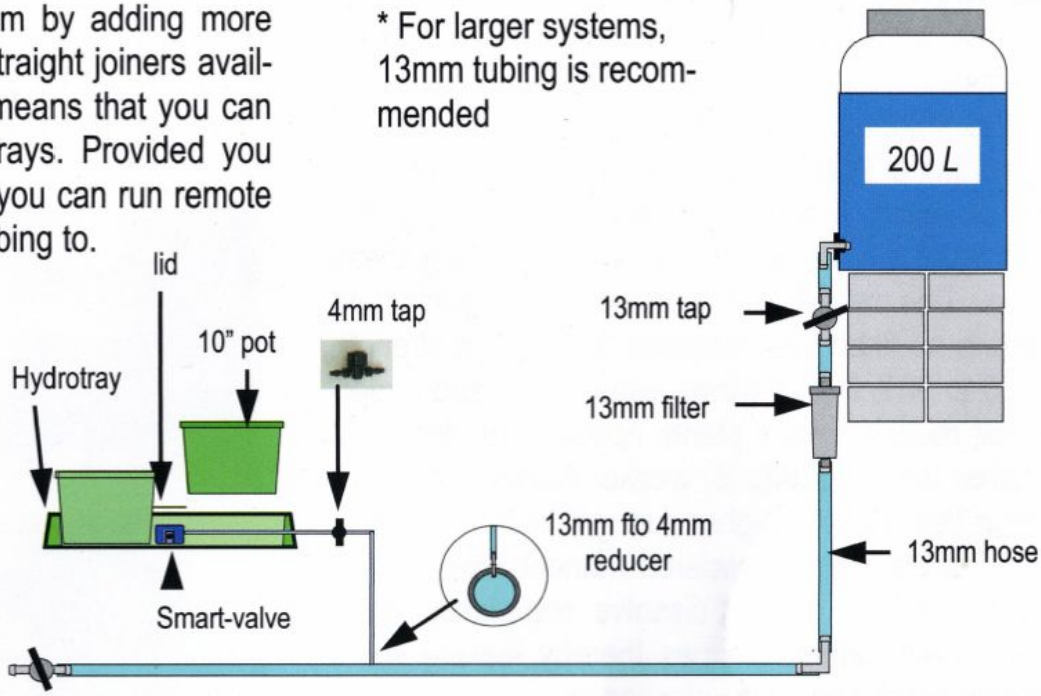
Back fill after the plant has grown above the rim of the pot.

EXTENDING YOUR SYSTEM

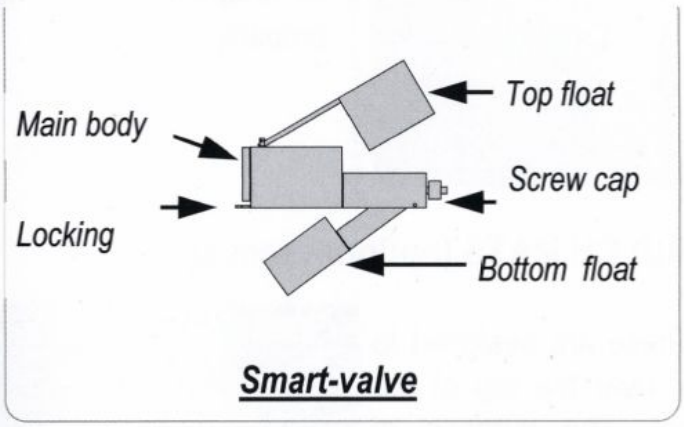
Extending your AutoPot system by adding more modules is easy - simple T and straight joiners available from your AutoPot supplier means that you can add one, two or dozens more trays. Provided you have nutrient flowing with gravity you can run remote trays anywhere you can get the tubing to.



* For larger systems, 13mm tubing is recommended



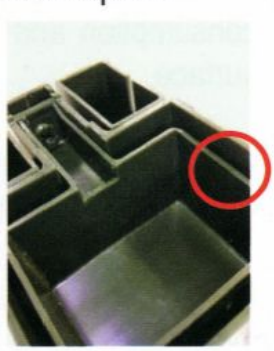
SMART-VALVE MAINTENANCE



Smart-valve

The Smart-valve is a sensitive mechanical device. Both top and bottom floats contain a silicon stopper against the top and bottom inlet holes respectively.

To check the bottom float, turn the valve upside down. The bottom float should have a slight bounce to it once you tap on it. The level of the bottom float should not rise above the level of the base of the Smart-valve's main body when held upside down (red circle pictured right). To adjust the silicon, you can adjust the 4mm hex head housing the silicon - check whether the float height is within tolerance, otherwise replacement silicon is available.



To adjust the top float, hold the valve upright. The top float should clear the main body of the valve (red circle below). If you tap on the top float, there should be a slight bounce. Adjustment can be made using the 4mm hex head on the top float.

Trouble Shooting

If the valve does not allow nutrient to flow, the most likely problem is a blockage in the valve. To clear blockages, remove the valve from the Hydrotray. Turn the valve upside down and lift the bottom float up and out of the main body of the valve. Clear the inlet hole with a small length of wire and hose the dirt off, preferably under some pressure. Be careful not to dislodge the silicon stopper.

- If the valve overflows;

- check the condition of the silicon stopper with the prior steps. Replace silicon if necessary.
- Check that the valve is securely located on the post within the tray to avoid movement during the watering cycles.
- Check for any foreign objects in both the upper and lower inlet hole.

REFILLING THE TANK

Keep a check on the consumption of the nutrient solution.

The standard nutrient mixing ratio is 5ml of Part A and 5ml of Part B AutoPot liquid nutrients into one litre of water. A nutrient monitor should register a reading of CF 24 or EC 2.4 when following these ratios. This recommendation is only a guide and there is no fixed rule. Increase the nutrient strength by 20 to 50% if your plants appear pale and under-fed or reduce if your plants appear over fertilised. Another rule of thumb is, weaker nutrient strengths during Summer and higher during Winter.

Avoid dissolving powdered nutrients directly into the tank. Most do not dissolve completely when dealing with larger volumes thereby leaving some residue which can cause blockages.

CLEANING THE TANK

Drain the tank and wash out with a hose. Fill with water, add a common laundry bleach (eg. White King) and leave it for 10 minutes. Drain and rinse well. Refill with nutrients as described earlier.

Repeat this after each crop. More often if you do not have good quality water.

FILTER SERVICING

The 4mm filter has an inner filter sponge which can be removed by unscrewing an end cap from the filter.

To disconnect the filter from the tubing, soften the ends of the tubing with hot water or a lighter to make the job easier. **Caution – Forcibly removing filter from the tubing without heating can damage the filter.**

Replacements if required are available from your supplier.

To connect or disconnect tubing from the joiners, always soften the connecting ends of the tubing with hot water or a lighter.

REPAIRING WARPED LIDS

Lids of reservoir tanks can get out of shape due to temperature variations. To fix the problem is easy. Just follow the steps described below:-

1. Heat the warped lid over a flame to soften it. A gas stove is a good choice. Position the lid about 3 to 6 inches over the flame and move it around to achieve uniform heating.

2. Once the lid is softened, replace the lid back to the tank and hold it in that position for 3 to 5 minutes and allow it to cool down.

3. The lid will now retain its shape to fit the tank properly.

MULCH MATS (optional accessory)

These are designed to fit over the top of the pot. The purpose of the mulch mats are;

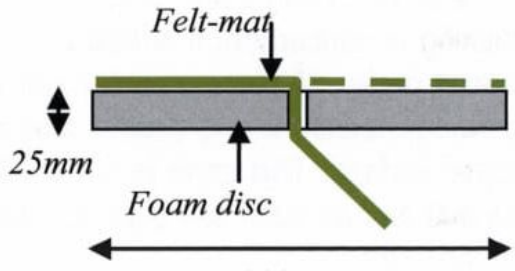
- to cut off sun light reaching the surface of the growing media to prevent algal development.
- to reduce evaporation, hence reduction in water consumption and subsequently salt buildup on the surface.
- to keep the roots cooler during summer and warmer during winter.
- to reduce pests which like to lay on wet media.

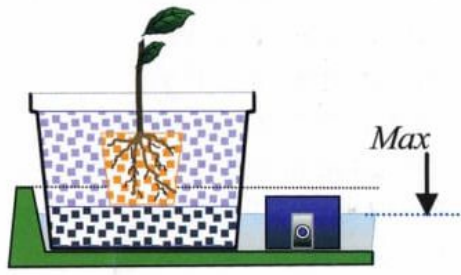
Can be reused. Wash after each crop.

AutoPot Foam Pads

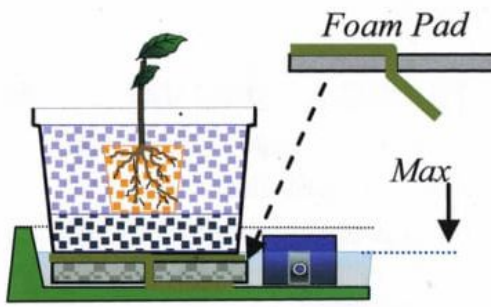
The AutoPot foam pad is an innovation by Jim Fah, the inventor of AutoPot Systems. This product is designed for plants that do not like wet feet, or for use when there is too much rain when grown outside.

The foam pad lifts the bottom of the pots by 25mm (*which is just about the maximum level set by the Smart-valves*) and yet water supply to the pot plant is being maintained by the wicking action of the mat attached to the foam unit. The foam pads also displace the water from the Hydrotray by as much as 80% which means there is more frequent water change in the tray.

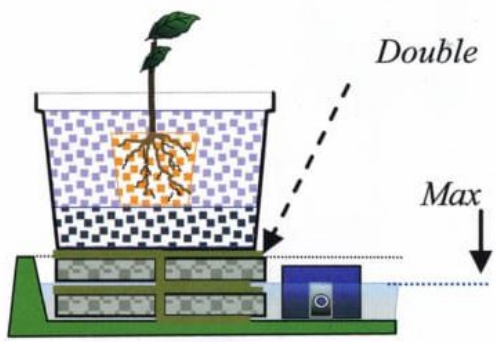




Pot without foam pad



Pot lifted by 25mm with one foam pad



Pot lifted a further25mm with two foam pads

A few important points;

1. It is vital to soak the foam pad with water before use, otherwise it may not draw water properly.
2. Some growing media works better than others. We prefer potting mix or perlite/vermiculite mix. Loose growing media such as 100% perlite or scoria are not so suitable as they do not conduct water properly through the felt mat.
3. When not required, you can remove the foam pads and allow the pot to sit directly in the tray. This treatment allows the plant to have better access for more water especially during hot dry weather.
4. You can stack more than one pad if you wish to give your plant a dryer condition.

Steps 1 & 2 - insert the strip of mat through the centre slot of the foam disc.
Step 3 - Soak the foam pad in water before placing in to the Hydrotray as shown.
Step 4 - Sit the pot directly on the foam pad.

Commercial tomato farm.

Mustard in AutoPot.

Eggplant in AutoPot

FLUSHING THE POTS

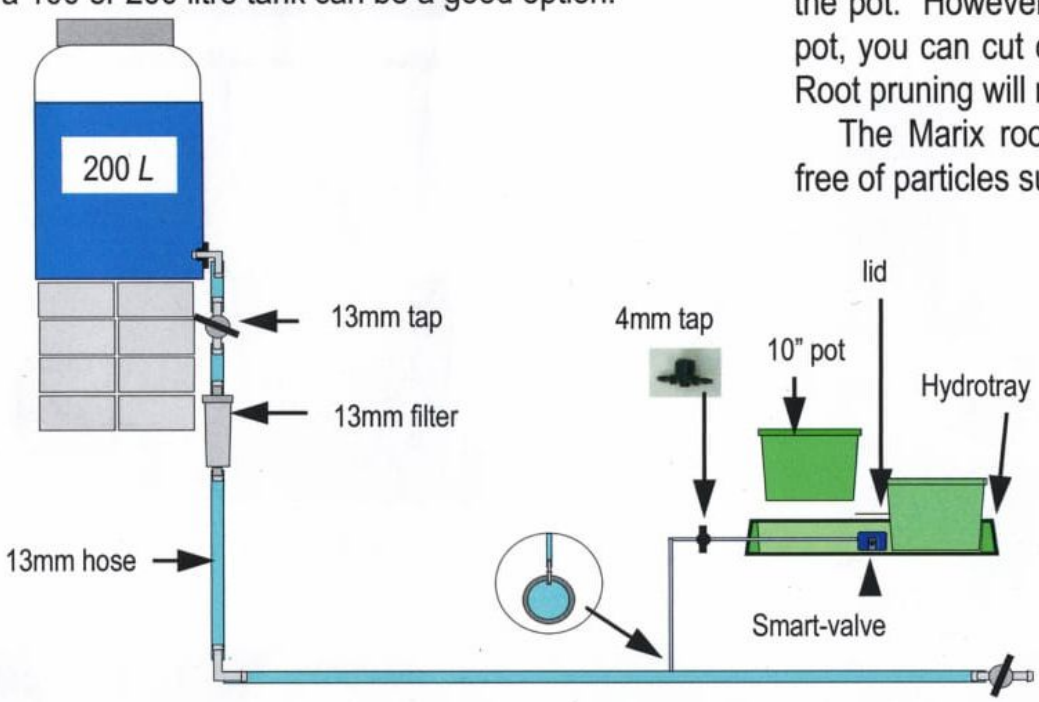
AutoPot Systems are different from others where flushing is concerned. It is better not to flush within a crop cycle. If you encounter salt build up in the growing medium this is usually only confined to the upper surface. This zone is too dry for the roots to survive and as such salt built up here has no effect on the plant.

Should you decide to flush, it must be done regularly (with 2 litres of water per plant) at fortnightly intervals. If you flush, say, after two months of growth this can cause severe root damage to the plant due to salt from surface of the growing medium being washed in to the root zone. Replace growing medium after each crop.

Reducing nutrient concentration is also another method for reducing excessive salt buildup when visible.

TAKING A LONG VACATION

A week away is no problem but if you are planning an extended vacation you may wish to take extra precautions such as using a larger tank. Either a 100 or 200 litre tank can be a good option.



WATER CONSUMPTION GUIDE

Water consumption of a plant varies from day to day, influenced by many variables. A full grown tomato plant on a Summer's day can consume around 1.5 litres of solution a day. This can potentially increase to 4 litres on a day when it is very windy with air temperature in the 40's. As a general guide, in periods of excessive heat, you can reduce the nutrient concentration of the solution due to the increased cycles of water your plants will receive.

Ultimately, installing the AutoPot Smart-pump system is the safest way of getting water & nutrients to all your plants if you have a large system or install modules at a height where gravity supply is not possible.

ROOT INTERFERENCE

The Marix root control mat should prevent, for most plants, roots from growing out of the bottom of the pot. However, if the roots still grow through the pot, you can cut off the roots only when necessary. Root pruning will not cause any harm to the plants.

The Marix root control mats also keep the tray free of particles such as perlite entering the tray.

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