

## Simple Home Hydroponics

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Hydroponics is the growing of plants in a water solution containing a balanced supply of essential plant nutrients and is often called soilless culture. There are many different systems of soil-less culture but they can be grouped into three main systems.

- Water culture or true hydroponics.
- Sand culture or aggregate culture.
- Nutrient flow technique (NTF).

The most practical system for home gardeners is sand or aggregate culture which provides support for plants using an inert media such as sand, gravel, peat, charcoal, vermiculite, perlite, sawdust and polystyrene beads or any combination of these substrates as long as the materials are not toxic to plants. As well as providing plant support, the media must be able to hold water and nutrients and provide aeration to the plant roots.

Soilless culture is used for home garden vegetable growing where:

- Space is limited.
- Soils are not suitable.
- Soil diseases are difficult to control (e.g. bacterial wilt in tomatoes).
- Water is scarce.

One of the traditional disadvantages of soilless culture is the relatively high capital cost involved in setting up a system but simple inexpensive systems can be developed using pots, polystyrene broccoli boxes, simple beds built from scrap building materials or any container that is not galvanised iron as zinc toxicity could develop. The container must be free-draining with drainage holes in the base. Lightweight media, such as a peat and perlite mix, require only lightly constructed containers while sand or sand mixes require heavier, solidly built bed to support the weight of the media.

The nutrients can be applied to the container in many ways, as a dry powder or as a nutrient solution. The nutrient solution can be applied to the surface of the media by sprays or drip emitters or from the bottom by a system of sub-irrigation. With all methods, the containers must be flooded from one to three times per day or frequently enough to keep the media moist. To leach accumulated salts from the media, in sand systems, the container should be flooded with ordinary water every one or two weeks and then drained.

### **GROWING MEDIA**

To assist home gardeners, DPIFM have developed a simple soilless culture system. Two media combinations are suggested, with the least expensive one being a 1:1 mix of local Finnis peat (Thunder Peat) and Mary River sand. The second mix is a 1:1 combination of Finnis peat and Perlite which is relatively expensive but provides a lightweight mix with good water holding and aeration characteristics.

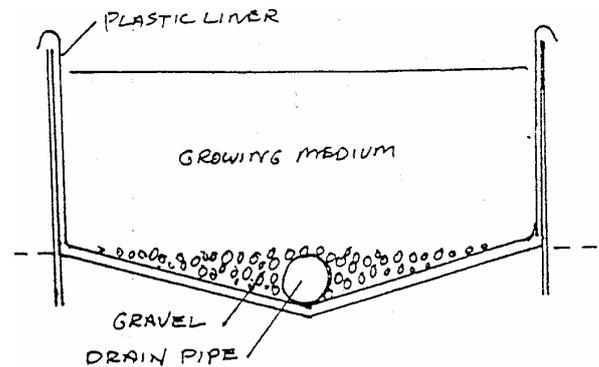


## BED CONSTRUCTION

In a suitable system the growing bed may be 4.0 m long and 1.0 m wide and constructed of Kliplok roofing iron and lined with 200 um thick black plastic film.

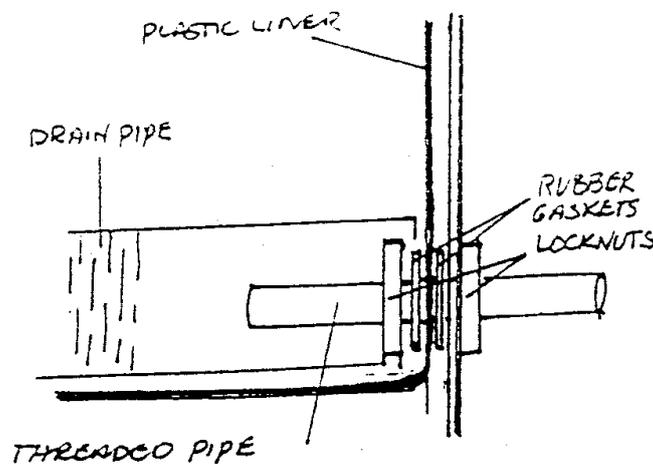
### Section

The bottom of the bed is shaped into a Vee, a 40 mm slotted poly drainage pipe is laid and this is covered by laterite gravel. The media is placed above this to a depth of approximately 250 mm. A drainage outlet is provided consisting of a 20 mm threaded pipe with screwed flanges and rubber gaskets on either side of the black plastic liner.



### Side View

The bed should be built with a slight slope to the outlet end to facilitate good drainage.



## NUTRIENT COMPOSITION

Using standard fertilisers, the following proportion or weights are used to make up a dry powder mixture. This fertiliser mix is used at a rate of 20-30 g (two to three heaped teaspoons) per square metre of bed surface area per week depending on crop requirements. It should be sprinkled evenly over the surface of the media and then watered in.

Major Elements:	Parts by volume	Grams for 1 kg mix
Potassium nitrate	8	400
Calcium sulphate	5.5	300
Magnesium sulphate	3.5	150
Triple superphosphate	2	100
Ammonium sulphate	1	40
<b>Trace Elements:</b>		
Mix equal amounts of a complete trace element mix and Ferrous sulphate	0.25	10
		1,000

This formula is basically for fruit crops such as tomatoes or capsicum. For leaf vegetables increase ammonium sulphate by 50 to 100%.

## GENERAL MANAGEMENT

Before sowing seeds or transplanting seedlings into the media it is advisable to spread two or three standard applications of the hydroponic fertiliser mix onto the bed and water in well so that a reserve of nutrients are built up. Several applications of a soluble fertiliser that has a high nitrogen content may be necessary early in seedling development to promote strong growth. This can be carried out with a water can and the frequency will depend on experience and careful observation of plant growth.

The irrigation system may be overhead micro-sprinklers, timed to come on for a brief period twice per day. The irrigation interval should be long enough to allow some surplus water to run out of the drain outlet after each irrigation. This will indicate that the media has reached full water holding capacity and a little surplus water has drained through. Over watering will leach nutrients out of the system and lead to reduced plant performance as well as wasting chemicals and water. Hand watering or drip irrigation can also be used but will have to be managed in a similar manner.

Growing plants in hydroponic systems requires the same cultural conditions as growing in soils. Knowledge of plant varieties, habits of growth and climatic adaptations is necessary and pests and disease still have to be controlled. Plant growth habit is not changed by soil-less systems so spacing of plants should ensure that adequate light is available to the plants. Generally, closer plant spacings can be used in hydroponic systems than are used in the soil.

For many home gardeners, soil-less culture is an interesting and relatively inexpensive hobby. Many exaggerated claims have been made about the system but it will teach the amateur the basic principles of plant nutrition and plant physiology as well as provide good yields of nutritious food for the family.

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