

Use of Simplified Screw Dripper to prevent clogging in the Hydroponics Systems

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Problem description

One of frequently occurring problems in the hydroponic and aquaponic systems is clogging of the of the drip type of system. Clogging occurs when particles from the nutrient solution get stuck in the tubes or there is bacteria growth in the tubes. In commercial hydroponic systems that only require small flows of nutrient solution, calibrated pressure-compensating drip systems are often used to supply the plants with a constant amount of nutrient solution between 2-16 litres per hour. These systems mainly include substrate cultures, such as sack cultures or culture troughs, but also some variants of simplified hydroponics.

However, commercial drippers are not available everywhere. In addition, despite their comparatively low price, they can still be too expensive, especially in the context of simplified hydroponics. There is therefore a need to find a simple alternative solution to replace the commercial drippers. A possibility has been developed to replace commercial drippers with simplified screw dripper to solve the problem of over watering in the hydroponics system.

Causes of clogging in hydroponics

Growing crops in hydroponics especially comes with some problems, that are often caused by inappropriate practices and unsuitable management of the growing system.

- Clogging can occur when pieces of growing medium get stuck in the water metering tubes. This affect the circulation of the whole system, causing damage to the crops in the hydroponics.
- Algae growth and proliferation is the second leading cause of clogging in the hydroponics system (Figure 1). Besides the effect on the circulation of nutrient solution, algae also compete with crops for nutrients which invariably affect the growth and development of crops in the system.

Solutions to the clogging problems

Clogging of the hydroponics system can be solved through.

- Regular flushing of the tubes with warm water to prevent clot formation.
- Change the growing medium from loose to a heavy medium such as expanded clay.
- To control algae growth in the system, it is recommended to:
 - minimize the exposure of nutrient solution to sunlight
 - paint the reservoir or nutrient tank black
 - avoid over watering of the seedling in order to prevent the growth of algae.
 - avoid overfeeding and nutrient imbalance
 - ensure adequate air circulation

Alternative solution is the use of **simplified screw dripper** as an alternative to commercial dripper.

Materials for screw dripper preparation

Tools and Equipment: Below are the necessary tools and equipment needed for setting up dripper.

- i. **Screws** - 6 mm or 6.5 mm diameter, 30 mm length, 1.5 mm pitch (Figure 1).and 6.5 mm diameter, 22 mm length, 2.5 mm pitch (Figures 2 and 3).
- ii. **Plastic Hose** - 5.8 mm diameter (Figure 4)
- iii. **Precision measuring tools:**
 - vernier calipers,
 - cutting tools (for cutting screws and hose to the required lengths),
 - screw insertion tools (manual or automated screwdrivers), and
 - pliers.



Drippers Set up

Preparation of screws

Obtain screws with the specified dimensions. Use calipers to verify the dimensions of the screws (diameter, length, and pitch). Ensure that the threads are clean and free of defects. Screws need to be trimmed with a cutting tool to halve the length. After cutting, smooth the cut edges to remove burrs.

Plastic Hose Preparation

Obtain a plastic hose with a 6.5 mm diameter. Cut the hose with cutter to the required length based on required water pressure and size of the hydroponics system. Ensure that the cut edges are clean and smooth to facilitate easy insertion of the screws.

Insertion of Screws into Hose

Secure the plastic hose with a plier to hold it steady during screw insertion. Be careful not to crush or deform the hose while clamping with the plier (Figure 5). Align the screw with the hose opening. Gently start screwing it into the hose, ensuring it goes in straight. Continue screwing until the desired insertion length is achieved. If the fit is tight, consider using a lubricant safe for plastic materials to ease the insertion process.

Hints and Tips

The use of drippers requires the nutrient solution to be almost free of solids. Otherwise, the drippers will clog very quickly, resulting in increased maintenance efforts. Therefore, the system should be flushed with fresh water to eliminate solids and to prevent the build-up of salts in the hydroponics system.