

Design of a hydroponic system: Open System

Technical information sheet No. 1

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The A and B tanks

Highly concentrated fertilizer stock solutions are prepared in separate A and B tanks to avoid precipitation. Solid fertilisers are used.

- The A tank holds Ca fertilizer and chelate.
- The B container holds most other elements and trace elements.
- KNO_3 is divided over the A and B tanks.

The acid tank(s)

Acid storage tank(s) with dosing equipment to neutralise bicarbonates and pH in water. Preferably use nitric acid, after that phosphoric acid and sulphuric acid

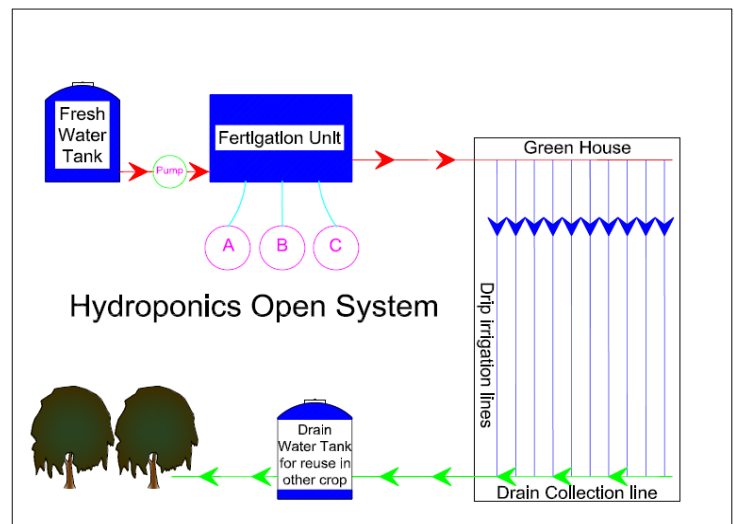
Dosing equipment

A mixing and pumping unit with two EC and two pH control sensors is needed to be able to detect malfunctioning (high risk). Reasonable pressure should be secured to avoid very high and very low pressure values that could result in too much irrigation water directly into the drain or uneven emittance per dripper.



Drip irrigation

Tubes and drippers distribute the nutrient solution. Dripper capacity is 2 L/h. 4 or 8 L/h capacity will result in irrigation water lost to drain water and sub optimal nutrient uptake. Pressure compensated drippers allow for more accurate dosing and are insensitive to small height differences in the field.



Drain re-use

In an open system drain water is not reused in the same crop to prevent spreading of soil-borne pathogens. As drain water contains expensive fertilisers use in other greenhouse or open field crops is useful. Catching and reusing drain saves 50% water and 60% fertiliser. A drainwater collection gully is connected to piping and a drain water storage tank. Design it in such a way that all drain water seeps on gravity to the drain water collection tank. From here it can be pumped elsewhere.



Operational control

It is important to know what is going to happen before it affects the plants. Therefore measure:

- Daily drain (litres): 30% is recommended.
 - <20% means some plants are too dry.
 - >40% means unnecessary pumping and loss of fertilizer and water
- Daily EC and pH of the drain water
- Once per 14 day analysis of the composition of supply water and drain water

The trends in the measured values tell how to adapt.