



# A simplified soilless system for low tech greenhouses

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## Background

One of the most advantages of using soilless systems is its capability to control irrigation water and fertilizers supply (Sonneveld and Voogt, 2009). In this respect, it can be indicated that soilless culture will help to increase water and nutrient use efficiency in regions where water is scarce like Saudi Arabia. Furthermore, soilless culture have proven, world-wide, to increase production over soil because of its ultimate advantage to overcome soil borne pathogens (fungi, bacteria, nematodes). In connection, soilless considers a friendly environmental system since it requires less pesticides, steam sterilization or chemical fumigation.

## Objective

This work aims to evaluate a simplified soilless growing system which can be adopted by local growers for the conversion of soil to soilless system. The system will be tested in terms of cost effective, water and nutrients clogging and leakage. In addition, the project will test the effect of different soilless systems and substrates in comparison to soil cultivation.

## Methods

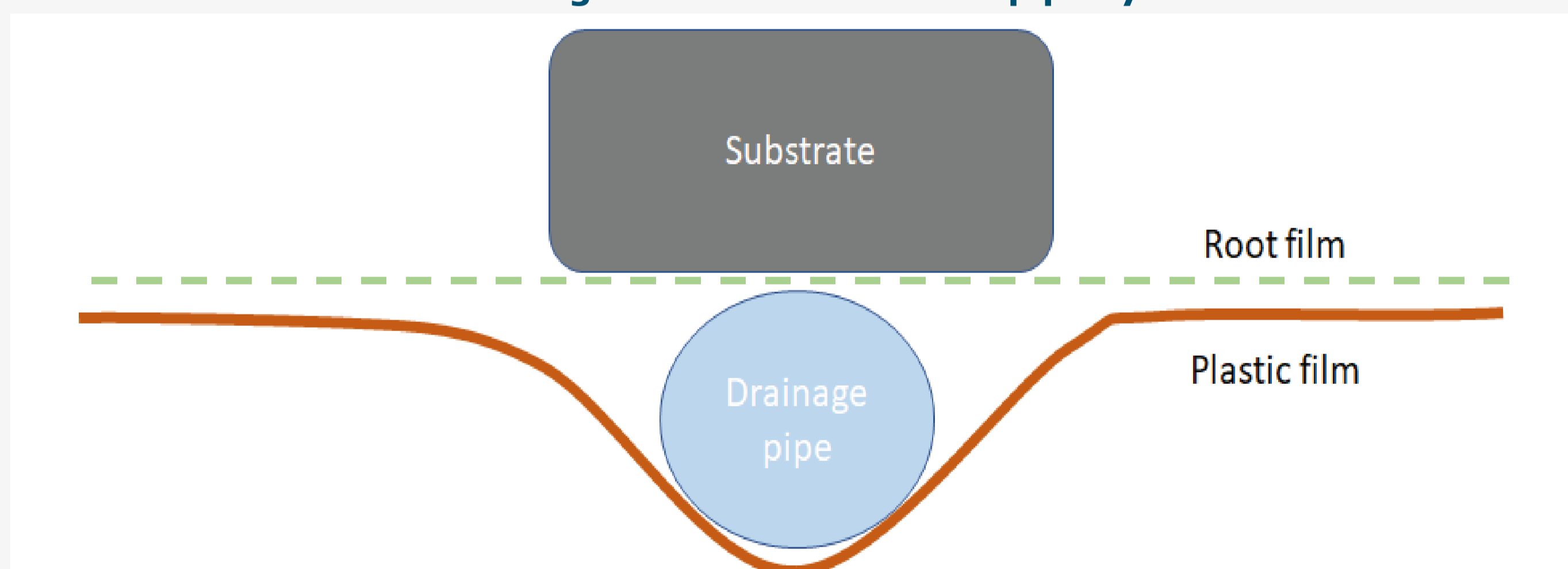
The experiment was carried out in the single span tunnel plastic greenhouses, with an evaporative cooling (pad and fan) system, at the National Sustainable Agriculture Research and Development Centre (Estidamah). The following techniques were installed:

- A: Soilless cropping versus soil cropping      B: Rockwool versus volcanic rock  
C: Different lay-out of volcanic rock          D: Collection of drainage water

The following cropping systems were installed:

1. Dutch boxes filled with volcanic rock + sub-surface drain pipe system
2. Reference 1 : rockwool slabs in steel gutters
3. Reference 2: soil cultivation.

Drawing of sub-surface drain-pipe system



## Results

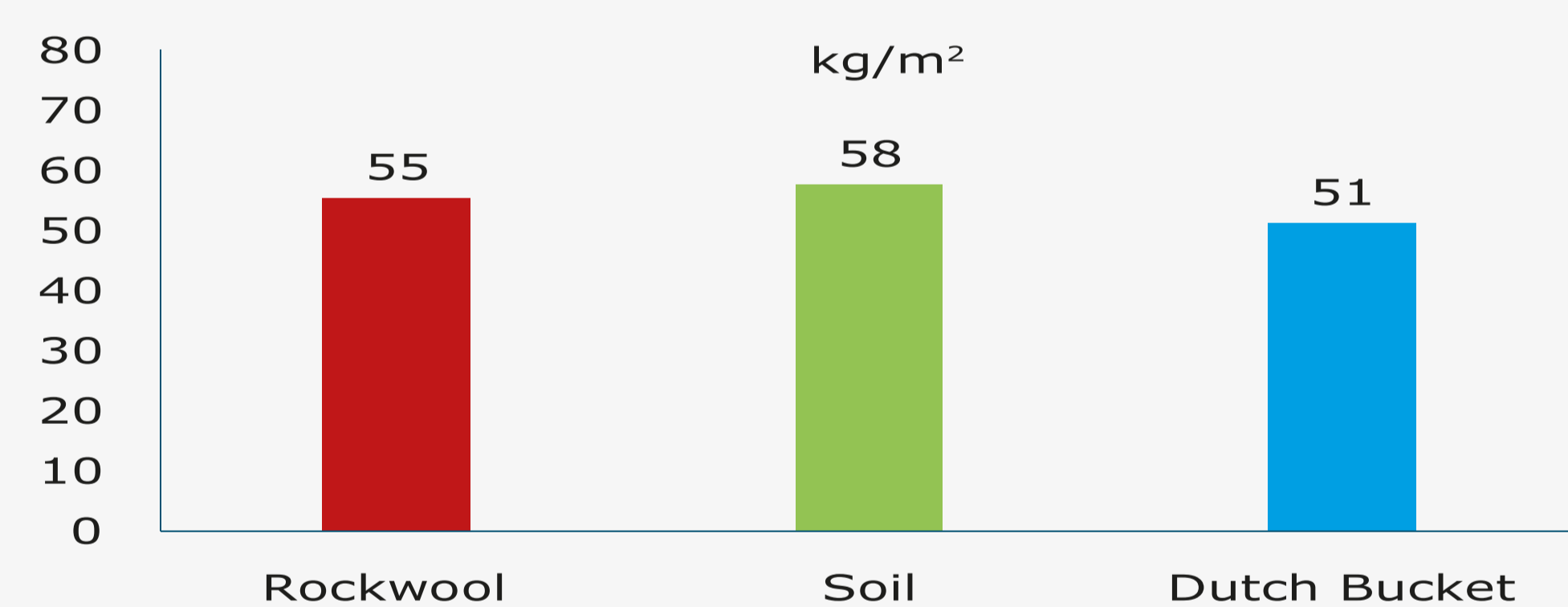


Figure 1. The overall yield results from rockwool, soil and the Dutch bucket.

## Conclusion

- A simple soilless system, consisting of buckets with volcanic rock, performed well and resulted in relatively good production, comparable with rockwool or soil production.
- Collection of drain water by the subsurface drainage systems was efficient and by this system all drainage water could be collected
- The overall irrigation was very high in this trial, with a total average of over 2200 mm, from which an estimated 1230 mm was taken up by the crop, resulting in 40 % loss through drainage.
- Due to the high irrigation, the use of fertilizers was with over 4 kg/m<sup>2</sup> very high and resulted also in a very high loss of fertilizers, which was more than 3 kg/m<sup>2</sup>.
- If the collected drainage water is reused in the same, or in another crop, it would contribute seriously to a high-water use efficiency and nutrient use efficiency

