



# Growing Systems Development

## Organizing synergy

To design novel substrate systems requires the cooperation of experts on plant diseases, climate, construction, economics of scale and plant physiology. WUR Greenhouse Horticulture developed a ten step design procedure (Figure 1). The core of the procedure are twenty four well defined plant growth properties (step 7). The effect of any system component on plant growth has to be strictly quantified and thus any system change can be evaluated in terms of growth.

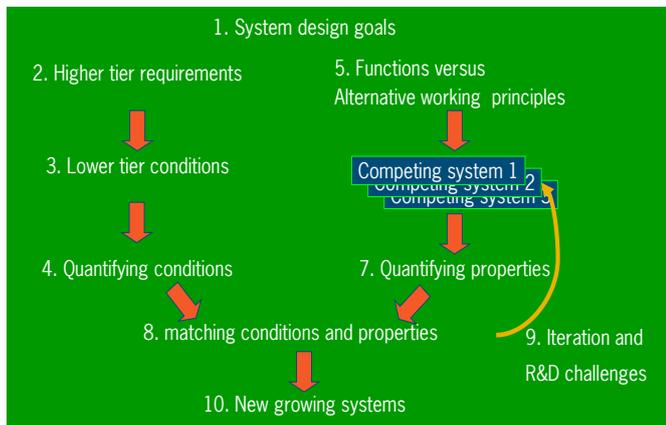


Figure 1. Procedure for evaluating growing systems and components.

## Quantified Plant Growth Properties

Examples of the twenty four plant properties are:

- Minimum substrate height. An algorithm based on substrate water retention data quantifies the minimum height for unhampered growth.
- A test based maximum penetration value shows which substrates will show poorer initial growth.
- Root temperature response data show what extra yield root temperature control will give.



Figure 2. Effect of temperature on initial root formation (left hand 26 °C, right hand 20 °C).

## The Larger Picture

It takes a lot of discipline to avoid short cuts to get to a system. To start growing in another economic and climatological environment is even more challenging. Wageningen UR Greenhouse Horticulture has developed a tool to use local climate data to design an optimal greenhouse local contractors can build and local growers can use. Our services thus include growing systems, greenhouse construction and training.



Figure 3. Locally produced Malaysian plastic houses designed to fit local climate by Wageningen UR Greenhouse Horticulture.

## Successful Systems

The ultimate goal is to grow plants. Examples are the aeroponics system Fleurago and the Cassettebed system.



Figure 4. Cassettebed system for cuttings.