2.
Resilient Substrates: The Relationship Between Biotic And Abiotic Factors

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Keywords: resilient substrate, abiotic factors, oxygen, pH, water content

Greenhouse horticulture is confronted with an increased limitation on the use of chemical crop protection. This is the result of a complex of processes such as unwanted emission of chemicals to the environment, and increased public demand for horticultural products without chemical residues. Also, the industry is faced with substantial costs and time to get authorisation of new means of crop protection. An alternative for chemical crop protection is known as "resilient growing". Instead of chemicals, means of a biological nature are used to prevent outbreaks of pathogens and to increase production.

In a research greenhouse facility 10 different resilient substrate concepts were investigated. Each concept consisted of addition of micro-organisms and/or biologically derived components. Successful application of these additions relies on a number of biotic and abiotic factors. Substrate characteristics as well as abiotic factors like temperature, water contents, oxygen concentration and pH play an important role in plant health and microbiological activity and composition. Successful resilient growing relies on optimal abiotic conditions not only for the plant but also for the desired micro-organisms. A complicating factor results from the interaction between crops, micro-organisms and applied components which all influence each other and can result in less favourable conditions. It is, therefore, important to understand the interaction and relationships between the biotic and abiotic factors.

For this purpose, tools must be available to monitor and analyze biotic as well as the pivotal abiotic factors in the cultivation environment.
To achieve this, oxygen concentration and pH in the substrate were monitored at 15 minute intervals in greenhouse experiments using optical sensors. Water content of the substrate was monitored at 5-minute intervals. Also, a method was developed to analyze aerobic microbiological activity in substrate samples. First results indicate that lower water content and higher oxygen concentration enhance early colonization of micro-organisms in the substrate. Also pH-drops were observed after application of some treatments. During the seminar an overview will be presented how measurements of abiotic factors in the substrate can be used to evaluate the effects of resilient substrate concepts