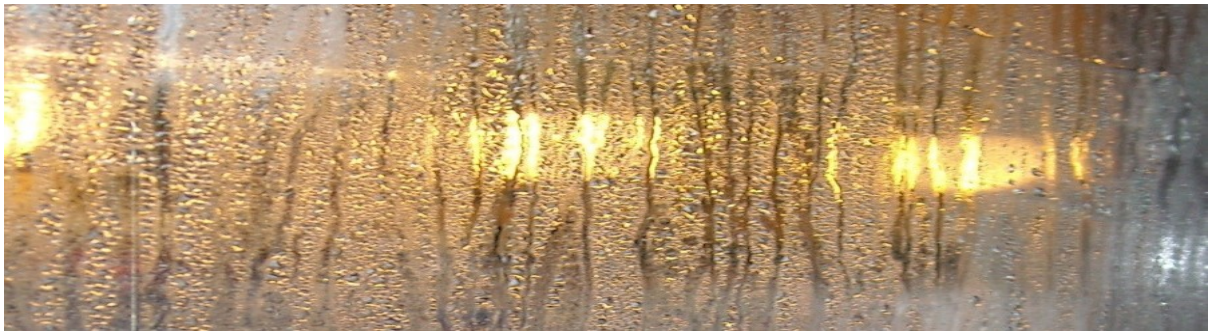

In this post, I share my experience with the semi-closed glasshouse. There is much confusion on how best to grow crops in a semi-closed glasshouse, and this series of articles tries to clear up confusion, inspire new discussion and educate.

Night-Time Humidity in a Semi-Closed Glasshouse

In the last posts we saw that the approach to day-time humidity in the semi-closed glasshouse differed much from the conventional glasshouse. How does the superior air movement affect the plants at night?

In a conventional glasshouse, growers will turn on the heating system when the humidity deficit (HD) falls below 1.0-2.0 grams per cubic meter, even if there is no heat requirement to keep the plants warm. The heat moves and warms the air creating a lower HD. Moisture is expelled through the vents. This helps prevent diseases such as Powdery Mildew and Botrytis. In a semi-closed glasshouse, it is safe to go as low as an HD of 0.2-0.5. This has significant consequences for heating cost and energy use. If we think about why conventional glasshouse growers want to use the heating system to reduce humidity, it is because the heat moves the air. The fans in a semi-closed glasshouse do a much better job (and it is cheaper) compared to heating. If we think about the real reason why growers turn on the heating system at a humidity of more than 85% (HD=1.3 at 18 degrees Celsius), it is because the measuring box that measures the humidity, is located near the top of the plant. A humidity of 85% in a conventional glasshouse means that in the lower region of the glasshouse, where there are lots of leaves, and little air circulation, the humidity must approach 100%. It is this humidity that causes Botrytis and Powdery Mildew. In a semi-closed glasshouse, the fans create a more homogeneous climate. A humidity of 85% near the top means that the humidity is also 85% near the bottom. It is estimated that 20-30% of fuel usage in a conventional glasshouse is used for dehumidification. A semi-closed glasshouse will reduce this significantly.

Night-time Cooling and Humidity

What about cooling at night? Can we reduce the 24-hour temperature at night by using the pad wall for cooling on a warm night? It seems counterintuitive to bring moisture into a glasshouse at night. Surely this will encourage Botrytis and Powdery Mildew. Let`s look at the following example.

If the outside temperature is 20 degrees, and the humidity is 60%, the wet bulb temperature is 15.1. This means we can blow in air of 15.1 Celsius at 100% humidity by turning on the pad wall. If we increase the temperature in the glasshouse to 18 degrees, the corresponding humidity is 84%, which is more than acceptable for night-time humidity. If we think back to the fear of introducing moisture into the glasshouse at night, we can now see that there is no risk of condensation if the blow in temperature in the glasshouse is lower than the glasshouse air temperature. As a result, we can cool and humidify the blow in air if we think there is an advantage for the plant, without fear of

exaggerating the chance of disease. This is particularly relevant when the daytime temperature is

Fig 1; Powdery Mildew in Tomatoes

high, and the glasshouse needs to be kept cool at night to reduce the 24-hour temperature. It is not unusual to see an inside temperate that is more than 10 degrees Celsius lower than the outside temperature when the night humidity is below 35%. Plants prefer a higher humidity at night. A relative humidity of less than 75% at night is not desirable.

Dark Weather

During extended periods of dark weather, plants will shed their roots because, like a muscle, if you don't use them, you lose them. Growers in conventional glasshouses try to prevent this by putting a minimum pipe in the glasshouse and open the vents. This will increase transpiration when there is a lack of sunlight. Root die back will be limited, and the action better prepares the plant for the next sunny say which will inevitably come. In a-semi closed glasshouse the fans do the activation and can create a lot more transpiration by moving the air more quickly. Even if the glasshouse is in recirculation mode and the air exchange to the outside is zero, the plant will still be activated by the air currents if the humidity is below 100%. Turning up the fan speed and achieving 5-6 air exchanges per hour is an excellent way to prevent root die off and have your plants ready for the first sunny day.

In my last post I displayed a table with recommended Humidity deficits. I made a differentiation between a HD that had a vegetative and generative effect on the plant. Some readers found it

difficult to understand why a high humidity has a generative effect on a plant. I recommend reading a previous post in which this is explained. You can find the link here

In my next post I will discuss what pests and disease pressures can be significantly reduced in a semi-closed glasshouse.

If you like to be copied in on future articles or would like to know more and have questions, follow me on LinkedIn Godfried Dol, or email Godfrey@glasshouse-consultancy.com or go to my website; http://www.glasshouse-consultancy.com. You can also download previous posts from this website.