Wind has minimal influence on greenhouse climate of cucumber grower

Van Dijk: 'Even greenhouse climate thanks to cavity screen at a low investment'.

In his search for a better insulating screen cloth, cucumber grower and inventor Sjaak van Dijk decided on two cloths on one system. Measurements by researcher Peter van Weel show that the climate under this so-called cavity screen is very even.

After his technical explanation on how to mount two canvases on one installation so that they don't hang on top of each other and don't tilt, Sjaak van Dijk himself summarizes the essence very simply: "I actually see it as a single screen with a high insulation value." And measurements show that this is indeed how it functions (see below).

Van Dijk owns the Klimrek nursery in Pijnacker and, together with his son Jimco, has been cultivating in another 3.1 ha garden for a year now. Previously, this was a rose nursery with a blackout screen. This has been converted into a greenhouse suitable for three cucumber crops per year.

Double wire bed

"We were looking for a high-insulating clear cloth, but that doesn't exist. You could then opt for a second screen, but we ran into several objections: the investment and the loss of light from two screen packages, but also the fact that we wanted to keep the lower beam free in order to be able to automate all kinds of things from above via the rail truss," he says.

"Besides, with two screen cloths hanging half a meter apart you always get air movement. If you hold the cloths very close together, four centimeters apart, you really have stagnant air. That works as extra insulation, like double glazing", adds son Jimco.

In consultation with installer Screen4seasons, two high-light-transmitting Luxous 1147 FR screens were mounted. A double wire bed and a stabilizer ensure that they stay tightly at the distance of 4 centimeters from each other. Furthermore, both canvases close against the truss when closed.

This creates compartments 5 meters wide each, which prevents air movement between the screens.

Even climate, very even crop

In the middle of the greenhouse, at the highest point, four 2% gaps can be drawn to drain off moisture. This does not produce any cold traps. "We were already used to dealing with a high moisture level at the previous location. Of course, this is only possible if you have an even climate; partly the reason for a highly insulating fabric system. When the moisture rises, we open the four gaps or we open the vents above the otherwise closed screen. That gives us plenty of opportunity to remove moisture," says the grower.
The cavity screen was installed at the end of last year. On January 4, the cucumbers are making sure they don't tip over. The stagnant air works just like double glazing." planted. Since then, there have been three crops. The experiences: "The gas consumption is lower than in the garden with a single screen. Furthermore, we see an even climate with a very uniform crop and a lower disease pressure. The choice of a clear cloth ensures that we can keep the screen closed during the day in cold, dark weather."

Between April and September, Van Dijk has the diffuse coating ReduFuse on the deck. "That makes it possible not to use the screen in the summer, because that would take too much light and create a less pleasant climate."

Temperature differences due to wind

Independent researcher Peter van Weel, commissioned by Greenhouse as an Energy Source, has spent the past year taking measurements to determine the potential of the system. In the spring, he first conducted a smoke test to find out the air movement in the greenhouse.

"The wind is the driving force behind temperature differences in the greenhouse, smaller when the screen is closed, larger when it is open. With the cavity screen closed, the air flowed very slowly toward the façade facing the wind." Van Weel finds this acceptable. The horizontal temperature differences under closed screen were 1-2°C. "That's neat," he says.

To exhaust moist air, the four gaps have to open. "You then see that the warm moist air flows vertically through the gaps. Because the heat content of the greenhouse is very high, you have an excess pressure. That causes the upward movement. At 11°C outside temperature and wind force 6, you saw no downward airflow through the gaps. Also, no air comes through the double. cloth. So the system does what it's meant to do," he says.

On average, the relative humidity rose to 93% with a closed screen, compared to 87% with an open screen.

Insulating screen with low costs

The measurements are still ongoing and Van Weel cannot yet make any statements about the energy savings. He estimates a 40% energy saving compared to growing cucumbers without a screen. We have an exciting time ahead," he says, "namely the start of the new crop in January. We will continue to measure. We won't have a full year of measurements until April and we'll be able to draw better conclusions."
Van Weel is primarily a researcher, but he also has suggestions for improving the system. Those lie in the area of dehumidification. "You can see the absolute moisture level rise at night when the screen is closed. You could still improve the moisture removal. Now it condenses against the facades. You could make an extra cold facade on the north side to increase condensation," he thinks.

"All in all, the conclusion is that this system fits the demand for denser screens. I'm happy with this though: it's a good insulating screen at a relatively low cost. During the presentation at the meeting to mark ten years of The New Way of Growing, the reactions were favourable. People listened with an open mind."

Less airflow

One of those present was Paul Arkesteijn of screen supplier Svensson. He is positive about this new approach: "It is a good way to install a double energy screen in an existing greenhouse where no second installation can be made, or where the lower grid should remain free. The small distance between the two screen cloths ensures that there is less or no air flow between the screen cloths," the supplier states.

"This stagnant air can lead to slightly higher energy savings. By choosing the two transparent energy screen cloths with high light transmission, the cavity screen can remain closed even after sunrise until the sun has warmed the greenhouse and a cold snap is avoided when opening," he says.

Summary

In consultation with a screen installer, cucumber grower Sjaak van Dijk developed a cavity screen: two screen cloths on one installation. It has a high insulation value and is cheaper than two screens. Researcher Peter van Weel found that the wind under closed screen has little influence on the air flows in the greenhouse. The horizontal temperature differences are 1-2°C. Moisture is discharged through four gaps without causing cold traps. The researcher considers it an asset on the route to more insulation.