



Lars Arvidsson: "When I came in contact with this sort of dehumidifying technology I didn't need long to think about it. It brings only benefits to my nursery."

## Swedish grower enthusiastic about using salt to dry air 'Dehumidifier maintains good climate despite closed windows'

**Dehumidifying greenhouse air with strongly hygroscopic salt is a technique which one grower believes in strongly, while another still has a lot of questions about. Swedish tulip and pot plant grower Lars Arvidsson didn't have to think very long about making the investment. He saves more than 60% on energy consumption and it's improved the quality of his tulips.**

When Las Arvidsson took over a nursery in Billeberga in the south of Sweden eight years ago it was the most out-dated nursery in the region. He had nothing to lose. He replaced the old wooden 10,000 m<sup>2</sup> greenhouse with a new one and built a processing area and office. Since then K.G. Hanssons Handelsträdgård AB

has expanded to become one of the largest tulip growers in Sweden, mostly supplying retailers.

### A good solution

The nursery has a conventional boiler-based heating system that runs for 80% on wood chippings and 20% on oil. Arvidsson doesn't use additional CO<sub>2</sub>. The climate in the south of Sweden is similar to the Netherlands. "Here it is not extremely cold, often cloudy and occasionally misty," explains the grower.

By far the biggest problem is the humidity in the greenhouse. The high RH is the primary cause of fungal diseases, a reduction in quality and consequent losses. Previously the grower tried to control the high air humidity by opening a gap in the screen. "But with one

gap of ten centimetres I lost an enormous amount of heat and so I wasted energy."

After meeting the importer of the Eco Climate Converter (ECC) it didn't take him long to make a decision. He believed this could be the solution to the humidity problem in his greenhouse. The first machine was installed 18 months ago. Now the nursery has three.

### Air purification

The ECC dehumidifies greenhouse air by using hygroscopic salt. The principle is quite simple. Humid air flows over a liquid salt solution. Heat is released through the condensation process. The heated and dry air is returned to the greenhouse. Afterwards the salt solution is regenerated.

The strongly hygroscopic salt, lithium chloride, also has a purifying effect on fungi and certain bacteria. So as well as drying the air it also reduces disease pressure.

The technology was developed and patented by AGAM Greenhouse Energy Systems, of Israel. Horticoop Technical Services is the distributor for the product in the Netherlands. "The ECC has already been tested in a few places but we haven't sold a machine yet," says Joost van Rooij, head of sales for the technology department. "It's a technology that still needs some recognition."

The machine is starting to make an entry into other countries for crops that are sensitive to high air humidity and its related fungal diseases. Pot plant growers in Denmark and Sweden are starting to gain experience and herb growers in Germany are becoming interested. "I think this technology is also interesting for growers of roses, gerbera and chrysanthemums. It can also be used in a closed greenhouse system. Therefore we're looking in particular for vegetable growers in the Netherlands who would like to test this technology."

### Without a gap

Hygroscopic dehumidification has further advantages. By far the most attractive is being able to apply this technology to Next Generation Growing. It offers the possibility to remove moisture without having to make a gap in the screen and by keeping the windows closed. Van Rooij: "Usually you remove moisture by maintaining the minimum heating pipe, making a gap in the screen and ventilating. We've calculated that the removal of moisture accounts for as much as 30 to 50 per cent of the total heat requirement." In addition the grower has to use chemical products to lower the disease pressure.

Of course, every grower has to assess the positive points with respect to their individual circumstances. The machine runs on electricity so how does this fit into the overall energy picture? Van Rooij: "I think it will be useful to small nurseries that have a low energy requirement and who want to keep their greenhouse frost-free. Put in the



The dehumidifier saves the Swedish tulip and pot plant grower more than 60% on his total energy consumption because he can keep the screen and windows closed.

right place it can bridge a temperature difference of 16 degrees C."

### Large investment

There are other points to consider. The unit takes up an area of 2x2x2 metres. That is quite large for treating a space of 1,000 to 1,500 m<sup>2</sup>. Add the cost per unit of between 22,000 and 25,000 Euro and it amounts to a big investment. Therefore Van Rooij is working on a lease construction so that a grower can pay for the equipment from the energy savings.

There have also been questions about air distribution. This will be easier in a greenhouse with a relatively low crop than in a greenhouse with an ascending type of cultivation and a full crop.

### Central station with air hoses

Lans tomatoes of Rilland, the Netherlands, is running an experiment with Wageningen UR Greenhouse Horticulture to test hygroscopic drying in its Optimakas greenhouse. Here they are working with a pad & fan in the wall which is connected to air conditioning units for the air hoses. The regeneration of salt – in this case calcium chloride – occurs at a central point. Researcher Marcel Raaphorst calculated the effectiveness of the system.

"The key lies in the heat that is released at the time that you don't really need it in tomato cultivation. Although the system can save a lot on the total energy consumption, you do need to be able to store the heat in an aquifer. The heat pump needed for this requires an additional cost calculation and it consumes energy."

### Large savings

Arvidsson didn't find the investment in the dehumidifier to be an insurmountable problem. Actually the capacity of his central heating system was a little on the tight side so he can well use the heat generated by the equipment in the period of the year that he produces the tulips. "In this way I save more than 60 per cent on the total energy consumption because I can keep the screen and the windows closed and maintain a good climate."

The improvement in quality possibly plays an even greater role. "Losing 250,000 stems annually because the RH is too high cost me SEK 475,000 (nearly 52,000 Euro). You don't have to think too long about that, do you? Such a machine is very quickly paid back."



The ECC can stand on the ground, but can also be mounted higher, as showed in other greenhouses.

## Summary

The Eco Climate Converter reduces air humidity and blows warm dry air back into the greenhouse. The system is starting gain ground in Germany and Scandinavia. Dutch growers are still hesitant. The technology is interesting for crops that are relatively sensitive to fungal diseases. Larger ascending crops can better use a central system connected to air hoses."