Controlling the Propagation Environment with a Computer

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I have been around the nursery business for 27 years having been groomed by my father. As a kid one of the first jobs I had was stripping the leaves on azalea cuttings after school and on weekends. I have been at the nursery full-time for 14 years, starting in ornamentals production, from propagation to sales.

I have always been interested in doing things the easy way. As kids, my brother Rick and I worked in the nursery. One job we hated was cleaning wood flats after liners were transplanted from them. Broken and rotten flats were discarded so we didn't have to clean them. One day we decided to break some newer flats and discard them, the only problem was, we got caught. Our dad made us repair them and it was a lesson well-learned.

In May of 1979, our nursery experienced a fire in our propagation house. Our dad always told us if there was ever a fire in a greenhouse, turn on the sprinklers and get out. I went in to turn the sprinklers on and there was no water. The electric line to the pump had broken and that was what started the fire. The greenhouses contained rooted azalea cuttings, ready to be transplanted to the liner stage. It was a total loss. I tell this story because I was there a few minutes after the fire started and felt helpless, I had no control over this environment.

In 1989, we started using a computer environment control system. We built a range of Stuppy Greenhouses with gutter vents and wanted computer-controlled vents. The system turned out to be a flop. We did not do enough research on computers. It was not predictable. It would open vents when it was freezing outside, turn off the heat, and caused many other problems. It was eventually replaced.

Rick and I did not give up even though our dad had seen enough of computers for awhile. He was ready to go back to thermostats for control. Then a computer company made us an offer we could not refuse. They offered us the equipment for 6 months on a trial basis; all we had to do was install it. It worked so well in the first 2 months that we ordered more equipment to do more ranges.

The first success we encountered was in humidity control. The azalea crop we were growing was an early one and had to grow during the winter. We always had trouble in double poly houses with condensation dripping on the foliage. This caused distorted leaves, little or no growth, and disease problems. With the computer we were able to lower the humidity allowing the plants to grow. Our dad hated to see fans drawing in cold air from outside and reheating it, but this method really lowered our humidity. We figured if we gained more #1 grade plants it would be worth the extra cost for the energy. Our energy bill increased by about 15% or $6000. We gained about $500 per house in quality of plants × 30 houses = $9000 gain per crop cycle. We were sold on the value of computer use in greenhouses.

Some major reasons to computerize the greenhouse environment:

1) Accuracy is the major benefit of computerizing. In a propagation house, water

is a critical factor, misting cuttings using light level rather than time is preferred. The computer will adjust the mist frequency as the weather changes, i.e., if you have a bright sunny day and the mist is averaging 10 min apart and suddenly clouds come in for 1 or 2 h, the mist frequency will be adjusted automatically. With time clocks someone would have to be adjusting them continuously. My point is to mist the plant when it needs it, not when the time clock says it is time to mist. Think about how you mist your cuttings. Are they really getting the water they want and need or are they getting what the grower thinks he wants to give them? It is hard to get growers to adjust a time clock several times a day, so they tend to apply too much water to cover themselves when it gets hot in the greenhouse.

2) Troubleshooting is an area where I use our computer a lot. One morning I was called to the propagation house. Under the benches it was 85F when normally we run 68F. The first thing I did was check the graph on the computer. The climate temperature was right, but the air under the benches was too hot. I then looked at the energy curtain, it was fully opened, but the computer showed it should be closed. I found out that one of the guys left the curtain in manual open position and forgot to change it back to automatic. On another occasion I found out that our heating pipe in one greenhouse range was too small. The plants in this range were always small and we could not figure out why. By graphing the climate temperature and heat target, I was able to guarantee that when it was below 35F outside, the house would drop below the heating target. As soon as the sun would come out, it would come back to temperature. By recording this I was able to raise the temperature on the boiler and also put different plants in this house. Without redoing the whole heating system we were able to adjust and get by with the system we had. My point is, a person cannot live in a greenhouse 24 h a day. With the use of a computer, you are able to record what happens in the greenhouse 24 h a day. Think about times when something was not growing right, were you able to find out what was wrong and were you able to correct it? A computer makes this task easier.

3) Another benefit to computerization is archiving. Archiving enters a record on the hard disk every night at midnight of all the days events. It can be used to track high and low temperatures, what equipment was running and several other things. One time I used the archiving records to set the light level on the shade curtain. I went back and looked at the highest light level for the season and worked down from that level. It sped up the process greatly because I had a starting point from which to work. It can also be used to graph how many times the mist ran in the propagation house, which is useful to use as a reference.

The major concern with computers is finding one you can trust and then trusting it will work for you. Questions always run through your mind, am I going to ruin a whole batch of cuttings or range of plants? You wonder this if you don't fully understand the settings you have set and how the computer is going to operate to achieve those settings. I suggest if you are looking at a computer, sit down and spend time up front to fully understand the system, so you can take full advantage of it and make yourself a better manager.

One final thought, a computer will never replace the human element of propagation, it only makes it easier. Our dad always taught us to never trust a machine, always keep an eye on it to make sure it is working.