

## COMMENTS ON SPLIT-NIGHT TEMPERATURES

*William Loefstedt  
New Haven Park Department*

Now that "Split-Night Temperatures" have been introduced through the Connecticut Agricultural Experiment Station's Science Newsletter and the May Connecticut Greenhouse Newsletter, this is a good time to review the thoughts and the experiments.

For a long time it has bothered me that while plants in summer could convert the products of 16 to 18 hours of photosynthesis in 5 or 6 hours to carbohydrates, starches and other products, we gave plants 16 to 18 hours of heated nights during the winter to convert the product of 6 to 8 hours of sunshine.

I asked just about anyone that I thought might have the answer or part of the answer as to how the conversion cycle worked. I got no answers or leads.

After asking Dr. Mehlquist for the tenth or twelfth time if he had come across anything new he said, "I think you have something of interest to the horticultural field and you should work out an experiment, and if the results warrant, get it published and in a couple of years the public might not give you the complete book but I am sure that you will get some interesting chapters."

With that in mind I laid out a plan and took it to the Experiment Station saying that I was sure it would work, because I had in part used it, but if it succeeded or failed I would not know why. Were they interested? I think it was good timing for they

were very much interested in any and all systems that either increased growth or showed possibilities of saving fuel.

The plan was to run the night temperature only as long as we thought was needed to convert the photosynthesis product and then drop the temperature as low as we thought the plants would stand and we could economically bring up to growing temperature as soon as the sun was ready to deliver.

We, Landon Winchester of the New Haven Park Department, William Buzzard of the Connecticut Agricultural Experiment Station, and myself, set up one of the houses in the Pardee Greenhouse range operated by the New Haven Park Department at East Rock Park.

It is a 24 x 40 glass house running north and south with doors in each end. The benches run around the perimeter and are 32 inches wide and 30 inches high. Two finned heat pipes run under each bench about a foot above the floor. The south end of the house has lattice and panels used at show time and obstruct quite a lot of light.

The house is at the base and directly east of East Rock (elevation 360') so that the rock shuts off one hour and ten minutes of sunlight at the start of the experiment and at Easter was shutting off one hour and forty minutes. It is apparent that the house did not give us the best of light conditions.

We altered the bench the test plants were to be grown on. We feel while that helped grow better plants, it had no effect on the cycle that was being tested and the insulation and type of bench can be left to another time.

On February 4, 1977 we purchased pot chrysanthemums and lilies about four inches tall from one commercial grower and more pot mums from another grower along with some rooted cuttings of geraniums. The plants in the growers' ranges were the checks.

There were five mum cuttings to a pot, clay pots from one grower and plastic pots from the other. The mums were the usual varieties planted to flower March 26 and April 7. The lilies were 'Nellie White.'

So, with Dr. Thorne, Plant Physiologist at the Experiment Station, observing we were off, and what a false start it was to be. On Sunday, February 6, a bitter cold day, a valve on the furnace caused it to shut down and before it could be repaired the house got real cold ( $20^{\circ}$ ). We carted the plants down to the furnace room where the water in the furnace kept them warm so they were warm but dark for two days. No damage noted.

We were unable to get a clock thermostat of the range we wanted ( $40-75^{\circ}\text{F}$ ), so we set up two thermostats, one set at  $60^{\circ}$  and the other  $40^{\circ}$ . A time clock cut them in and out. The  $60^{\circ}$  was set to come on one-half hour before sunrise. We figured that would have the plants at growing temperature when the sun was delivering upward of 1/2 foot candle of light, the level Kenneth Post said most plants could use.

As the growers we were checking with grew at straight  $60^{\circ}$  night, we ran the  $60^{\circ}$  until 11:00 p.m. and then the  $40^{\circ}$  thermostat took over. However, with the thermostat two feet over the bench, the plant temperature was generally  $44-45^{\circ}$ . The growers vented at  $72^{\circ}$ . We tried to vent at  $75^{\circ}$ .

One grower fed 20-5-25 at every watering and the other used 20-20-20 every third watering. We fed 15-15-15 for the month of February and then 4-10-10 (tomato food) at every watering. We used 72-75° water as early as possible before sunrise when the ambition was working in top form. This again is not part of the cycle operation but a cultural plus.

One set of mums had one spraying of a growth retardant and the other had none. Both growers gave two doses of retardants. The house was shaded March 29 to prepare it for the Easter show.

Now for the rewards for our effort.

Considering the reduction of daylight and the lattice work on the south end of the house reducing light strength, the mums were a good commercial crop every bit as good as the checks and 7-10 days earlier.

The lilies were something special, stalks straight and heavy, eight to eleven blooms and two to three weeks early. They were so early we put them for two weeks in a house that had 40° all night, and a week before Palm Sunday put them back into the heat and they responded nicely by Palm Sunday.

One retailer said that if we could grow a crop of lilies like that next year he would be glad to give us a deposit now on an order of 1,000 plants.

The geraniums if anything were too well grown for ordinary commercial trade. The growth was heavy and stocky and were in good bloom in 9 weeks. We are of the opinion that had we run at 65° we could have brought many of them in earlier.

There are many varieties of plants growing in this house, so we feel that the Split-Night Temperature can be used for many plants.

We feel that we have shown that good plants can be grown at saving of fuel under a Split-Night Temperature. How much saving we ask the folks with slide rules to figure out.

Split-Night Temperature is not a cure-all for bad culture or poor application of heat and light.

There might be some gain from slowing down the plants' metabolism. We hope that physiologists like Dr. Thorne and operators of growth chambers will work on it and perhaps they will tell us just how long and how high we need to keep the temperature. As Dr. Mehlquist said, "If we can reduce the length of the warm night temperature an hour or even minutes and put it in use across the country, it would be quite a saving." We had no way to check fuel use. We have since put an electric clock in the thermostat circuit so we can tell how long the circulators have run.

We hope to set up a bench with capillary watering and unless someone with growth chambers beat us to it, try it on a crop of poinsettias. We hope someone does.

Why did the lilies come in so early? We don't know, but hope someone does. It would be nice if growing time could be cut short so that the lilies can be planted before Christmas.