SPLIT-NIGHT TEMPERATURES FOR EASTER LILIES

Jay S. Koths, Extension Floriculturist

Dropping the greenhouse night temperature 10°F for six hours during the middle of the night conserves fuel. It has been used on several crops including Easter lilies by Loefstedt (1977). He found that they flowered at the same time as those grown with a constant night temperature (CNT).

To determine more critically the effect of split-night temperatures (SNT), a block of 96 'Ace' lilies was planted Nov. 28 (17 weeks or day 119 before Easter) in a 60°F house and covered with clear polyethylene to maintain a soil temperature of ca 60°. On Jan. 4 (day 81) they were graded and stratified with half of them placed under a split-night temperature of 60°/50° from 11:00 p.m. to 5:00 a.m. The control plants were slow and were raised to 65° on Jan. 4. Through an oversight the SNT house was not also raised 5°.

On Jan. 16 (day 69) the treatments were again stratified and split with half of each moved to the corresponding house. The SNT temperatures were increased to 65°/55°. On Feb. 8 (day 46) the control plants had advanced sufficiently so that all temperatures were reduced 5°. Day temperatures were 5° higher than night with venting starting at 10° higher than night.

Table 1. Temperature treatments

Date	11/28-1/4	1/4-1/16	1/16-2/8	2/8 on
Day	119-81	81-69	69-46	46-0
SNT	60°	60/50°	65/55°	60/50°
CNT/SNT	60°	65°	65/55°	60/50°
SNT/CNT	60°	60/50°	65°	60°
CNT	60°	65°	65°	60°

The soil mix was 3 (soil) : 2 (peat) : 1 (sand) in clay pots fertilized weekly after emergence with 15-0-18 from calcium and potassium nitrates (a 3:2 ratio).

The soil temperature is of concern with SNT. Mr. Loefstedt (1977) watered his plants every morning about sunrise with warm water to raise the temperature of the soil. In these experiments, plants were watered, only when needed, with cold water which depressed the soil temperature about 5^{o} as measured by a thermograph sensor buried in the pot. At night, under SNT, the soil balls did become colder than the controls, but by 8:30 a.m. the temperature differential was consistantly only $3^{o}F$.

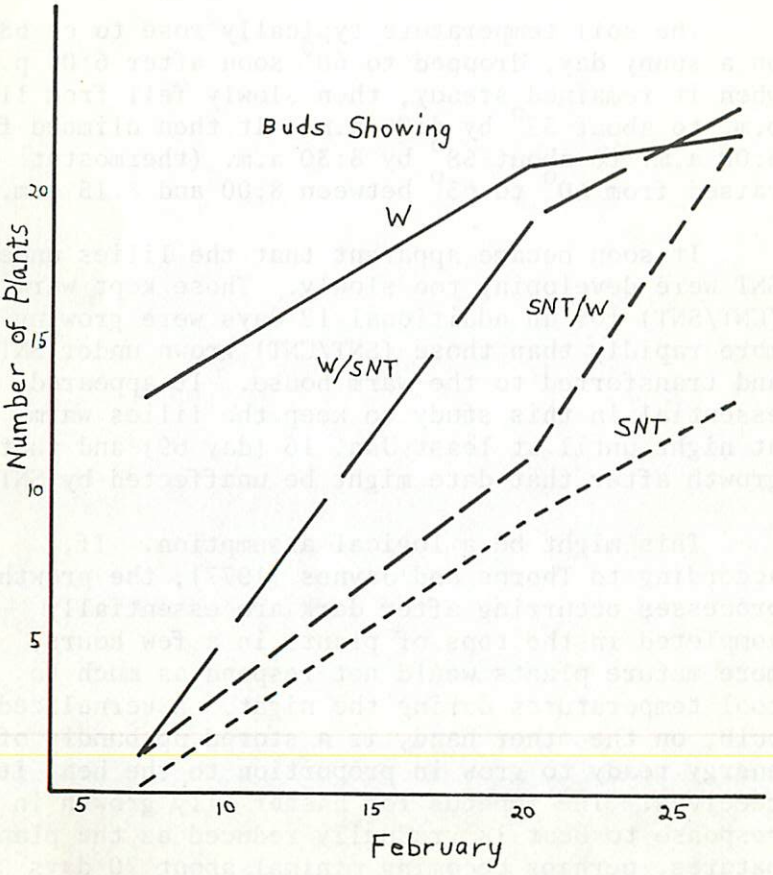
The soil temperature typically rose to ca 68^{o} on a sunny day, dropped to 60^{o} soon after 6:00 p.m., when it remained steady, then slowly fell from 11:00 p.m. to about 53^{o} by 4:00 a.m. It then climbed from 5:00 a.m. to about 58^{o} by 8:30 a.m. (thermostat raised from 60^{o} to 65^{o} between 8:00 and 8:15 a.m.).

It soon became apparent that the lilies under SNT were developing too slowly. Those kept warm (CNT/SNT) for an additional 12 days were growing more rapidly than those (SNT/CNT) grown under SNT and transferred to the warm house. It appeared essential in this study to keep the lilies warm at night until at least Jan. 16 (day 69) and that growth after that date might be unaffected by SNT.

This might be a logical assumption. If, according to Thorne and Jaynes (1977), the growth processes occurring after dark are essentially completed in the tops of plants in a few hours, more mature plants would not respond as much to cool temperatures during the night. A vernalized bulb, on the other hand, is a stored up bundle of energy ready to grow in proportion to the heat it receives. The impetus for Easter lily growth in response to heat is gradually reduced as the plant matures, perhaps becoming minimal about 70 days before flowering.

However, these conjectures are not clearly substantiated by the data. Easter lilies are notoriously nonuniform. Twenty-four bulbs are too few for any treatment. Two bulbs in the SNT/CNT treatment proved to be "early budders." The growth curves (Fig. 1) for SNT/CNT and CNT/SNT are very much the same. Both of these treatments were approximately 5 days behind the control in the "bud tip" and "puffy white" stages.

Figure 1. Dates that buds became visible on Easter lilies grown under various split-night temperature schedules.



Mr. Loefstedt (1978) observed that the six hour "cold" period may not be the optimum manipulation. If the plants have indeed completed their "dark" growth processes in a few hours and the remainder of the dark period is quiescent, why not drop the temperature to, say, 35°. The obvious drawback is excessive soil cooling. This might be overcome by some procedure such as bottom heat under a bench in which pots were suspended through holes in a solid top. Mr. Loefstedt also suggests that it may be better to cool the crop early in the night, allowing the soil to warm up before daybreak. There are many questions to be answered.

In summary, dropping the temperature 10° from 11:00 p.m. to 5:00 a.m. slows lily growth when young. There is an indication that they may not be affected as much during the latter stages of forcing and that SNT may be practical for finishing the crop.

Loefstedt, William. 1977. Comments on split-night temperatures. CT. Greenhouse Newsletter 80:8-12.

Loefstedt, William. 1978. Personal communication.

Thorne, J.H. and R.A. Jaynes. 1977. Split-night temperatures can save fuel. CT. Greenhouse Newsletter 79:1-4.