

Note on Remote Temperature Control

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Terry Gilbertson reported on the use of a device to sense plant temperature and control the temperature of a greenhouse in CFGA Bulletin 287. During the winter of 1974-75, periodic recordings were made of plant temperature as sensed by the infrared thermometer, aspirated air temperature, and outside air temperature. The greenhouse was glass-covered, with about one square foot of carnation foliage on the south side of a north bench being monitored. The house size (16x18') prevented a large area from being sensed.

As there is no indication in the literature as to what the actual plant temperature should be, the infrared thermometer was initially set in accordance with the aspirated air temperature of 52 to 54°F night, heating to 61 to 62°F day, and ventilation at 65°F. Fig. 1 shows examples of data obtained between May, 1974,

and January, 1975. There was no immediate effect on production, but as the season became colder, there was an increasing tendency for the plant temperature to drop below the air temperature. In January, the difference became sufficiently great as to have obvious effect on color, with brick reds and tendency to bull-heads. The infrared thermometer had to be reset to bring the plant temperature in accordance with air temperature. The device was calibrated several times and showed no tendency to lose its calibration. As the season progressed into the spring, it was found necessary to re-adjust the infrared thermometer downward to prevent excessively high plant temperatures.

It appears that plant temperature may be strongly influenced by the roof and wall temperatures of the greenhouse. There also seems to be a fundamental problem with infrared devices for controlling greenhouse temperature. The system senses radiant, thermal energy from the plant, which is a function of temperature. Nevertheless, house air temperature and plant temperature gradually diverged with changes in the season.

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The data show how little we actually know about plant temperatures in greenhouses. If we are to make any significant breakthroughs in temperature control, we must know more about how plant temperature changes with the type of house and season.

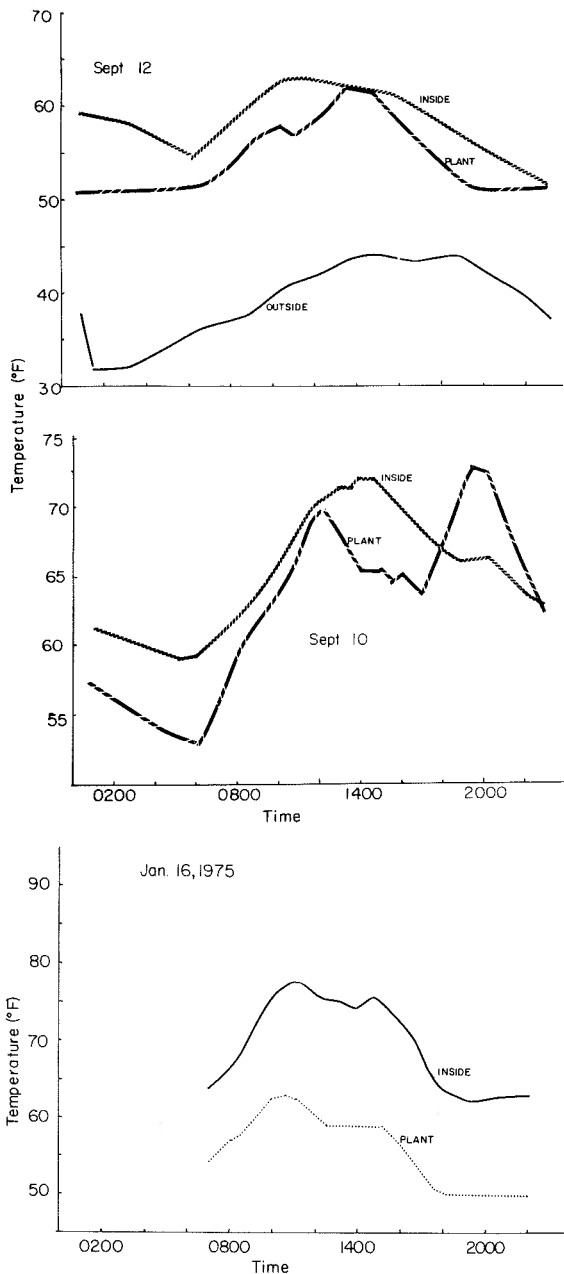
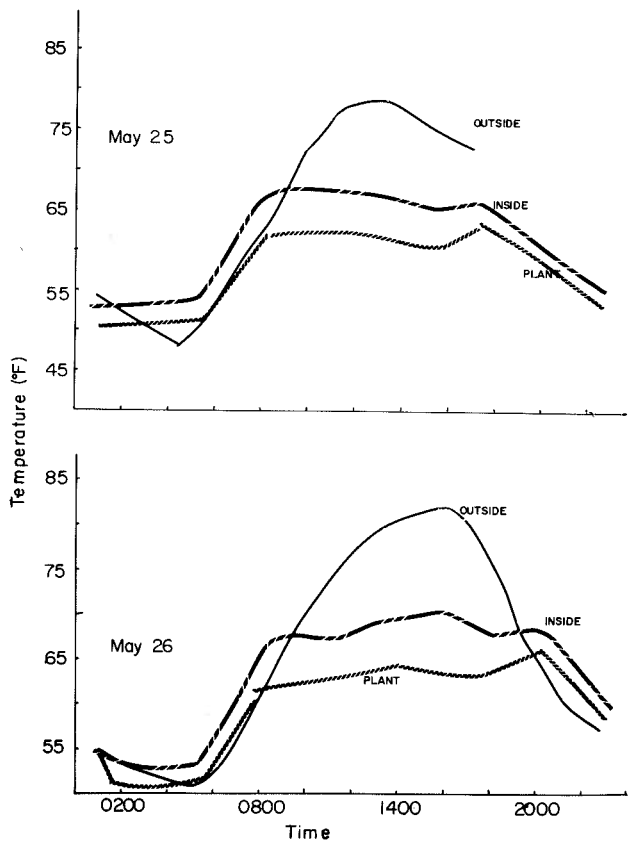


Fig. 1: Examples of plant, air and outside air temperature obtained when controlling house temperature with an infrared thermometer. Outside air temperature for January 16 was near zero. On Sept. 10, the pad system was turned off at 1700, and the effect on plant temperature can be seen.