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This was tested in a preliminary experiment. Five chrysanthemum cultivars, 'Ruby Mound,' 'Purple Waters,' 'Lipstick,' 'Muted Sunshine' and 'Minn Yellow,' were planted in 4" pots on December 16. They were maintained in a greenhouse at three night temperatures and 70°F during the day except on sunny days when the temperature rose to 75-80°F.

Rooted cuttings of the five chrysanthemum cultivars were supplied through the courtesy of Stafford Conservatories, Stafford Springs, Connecticut.

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smaller than those grown at 60° (Figure 3). Even so, only one plant of 'Muted Sunshine' (out of the 30 plants at 50°F) was partially budded at termination on February 27. Growing at 50°F nights and 70-80°F days did not prompt initiation of buds.

These three temperature treatments were duplicated but the plants were allowed to dry out a bit more. This was not successful. Without sufficient water, many of the cuttings failed to grow properly. As they grew larger, it was difficult to water the wilting ones without getting some water on others. But even so, some bud formation was prompted by this treatment.

With anticipation that positive results would be obtained with temperature oscillation treatments in the greenhouse, a set of control plants was placed in a growth chamber. The temperature was controlled at 60°F for eight hours, 70°F for 16 hours during which 40 lamp-watts fluorescent plus 20 lamp-watts incandescent light were supplied per square foot. To provide water, a Vattex pad* was installed with one end dipping into a reservoir which was filled every 2 to 3 days. As the plants grew larger, capillarity was lost on several occasions and the pots became quite dry.

The plants in the growth chamber all set buds (Figure 4). 'Ruby Mound' set buds by February 8, 'Purple Waters' and one 'Lipstick' by February 12 and all others by February 27. 'Minn Yellow'

These temperature occurred on an estimated 12-15 occasions after differential temperature treatments were begun on December 31 and before termination on February 27.

Five varieties with three replications were then subjected to the following temperature and watering regimes beginning on December 31.

Greenhouse
60° day, 60° night—never allowed to become dry
60° day, 60° night—allowed to dry occasionally
60° day, 50° night—wet
60° day, 50° night—dry
60° day, 40° night—wet
60° day, 40° night—dry

Growth Chamber
70° day, 60° night—watering, wet but occasionally dry

All groups in the greenhouse were given four hours of incandescent light from 10 p.m. to 2 a.m. at ca 4 lamp watts per square foot.

The soil was 3 (composted fine sandy loam): 2 (sphagnum peat): 1 (sand) amended with 6 lbs. dolomitic limestone (to adjust pH to ca 6.5), 5 lbs. 0-20-0 and 4 lbs. Osmocote 14-14-14 per cubic yard. Plants in the greenhouse were fertilized three times with 19-4-24 at 350 ppm N. Those in the growth chamber were not fertilized but grew larger than those in the greenhouse while showing no nutrient insufficiency (at termination, nitrogen levels were very low).

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*Supplied through courtesy of Vattex Corp., Center Moriches, New York
Observation and Results

Moving plants to $40^\circ$F each night severely retarded growth (Figure 1). Some showed chlorosis. This was typical of mum plants that have root action impaired by any of many factors such as waterlogging of soil, ammonium toxicity or excessive soluble salts. 'Ruby Mound' set crown buds but since the plants were severely stressed, the budding can hardly be attributed to the temperature oscillation alone.

The $50^\circ$F night temperature did not depress growth as much as expected (Figure 2). Excluding 'Minn Yellow,' which grew poorly and was self-branching, the $50^\circ$F group produced 80% as many shoots long enough to be pinched by February 19 as the $60^\circ$F group. The plants were only a bit

Figure 1. Garden mums grown at $40^\circ$ nights, 65-80$^\circ$ days, grew poorly and some were chlorotic.

Figure 2. Garden mums grown at $50^\circ$ nights, 65-80$^\circ$ days, grew nearly as well as those at $60^\circ$ nights.

Figure 3. Garden mums grown at $60^\circ$ nights, 65-80$^\circ$ days.
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PREMATURE BUDDING OF GARDEN MUM STOCK PLANTS

Jay S. Koths
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