Colorado Flower Growers Association

IN COOPERATION WITH COLORADO STATE UNIVERSITY

Ray App, Secretary, 4434 Lowell Blvd., Denver, Colorado

Bulletin 89 May 1957

Some Effects of

Greenhouse Cooling on Carnation Timing

by W. D. Holley

Carnations grow faster when greenhouses are cooled during the summer and early fall. Approximately two weeks are gained between planting and pinching. The time from pinch to midpoint of first crop is approximately the same as for uncooled carnations. The time between first and second crops is reduced by four to five weeks.

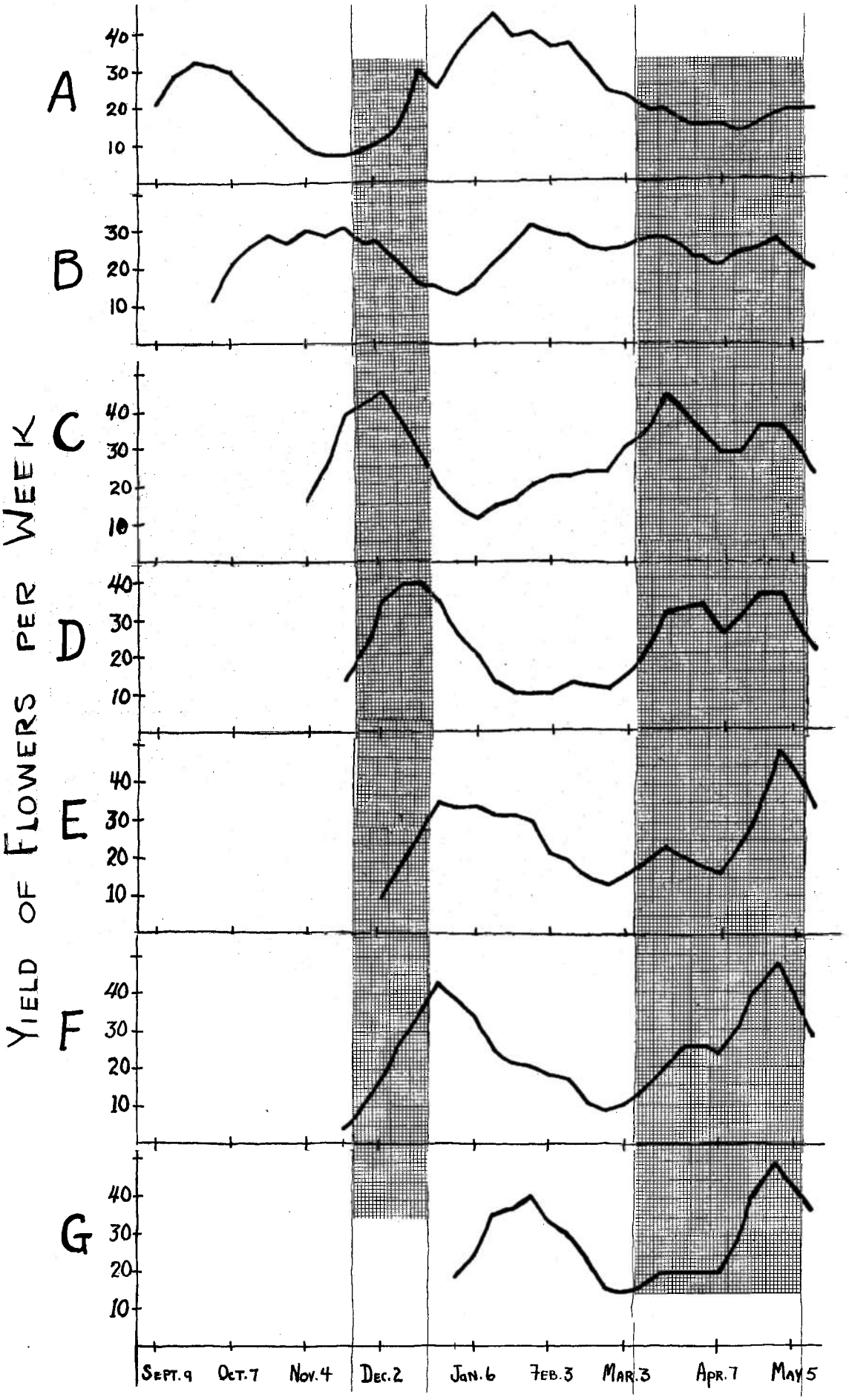
Large rooted cuttings were benched at 10-day intervals from May 25 to July 15, and a final planting was made August 5, 1956. The greenhouse was cooled by fans and evaporative pads according to formulas presently in use. These cuttings were pinched as lateral breaks cleared--from 10 to 20 days following planting. Each planting occupied 21 square feet of bench area.

The distribution of production from these timing treatments is shown in the accompanying figure. The Christmas and Easter-Mother's Day periods are cross-hatched for accent. Plantings of June 15 and June 25 (C and D) produced heavily for both periods, hence would be considered ideal timing for direct-benched, single-pinched carnations. Plantings E, F and G were late for the Christmas marketing period and late for Easter, though they produced heavily for Mother's Day and late May.

Some variation was noted in flowering time of the first crop which is not attributable to light intensity and day length. Although an attempt was made to plant uniform cuttings, it is next to impossible to do this. The type of cutting, how it has been handled or stored and several other factors influence this period between pinch and first crop. Note that F planting began flowering earlier than E and peaked at the same time although it was benched 10 days later. Some of these irregularities are the subject of further investigation.

A summary of timing is presented in the table. Planting A (May 25) required 17 weeks to the peak of the first crop. Each successive planting to E (July 5) required more time. Probably 25 weeks is the maximum time required from benching to the midpoint of first crop. The actual time between the pinching date and flowering is about the same as for uncooled carnations.

The time from midpoint of first crop to midpoint of second crop was 15 to 17 weeks, 4 to 5 weeks less than for uncooled carnations. This difference is due primarily to the increased size of lateral branches at the time the first crop is harvested. Second crops that develop during the spring and summer could be expected to be much faster. If plants are


A
B
C
D
E
F
G
40
30
20
10
YIELD OF FLOWERS PER WEEK
SEPT. 9
OCT. 7
NOV. 4
DEC. 2
JAN. 6
FEB. 3
MAR. 3
APR. 7
MAY 5

to be grown for two crops only, 33 to 41 weeks are needed in cooled greenhouses.

Third crops from these plantings are in various stages of development. Planting A will cut heavily in June and July--indicating a total of 14 months is required for three complete crops. To obtain this heavy third crop in a minimum of time, it is necessary to leave at least 6 inches of stem when cutting the second crop, whether there are breaks on this portion or not. Cutting near the origin of stems on the second crop reduces and materially retards the third crop.

Planting Date	First crop peaked around	Weeks from planting	Midpoint of second crop	Weeks between 1st and 2nd crops
A May 25	Sept. 23	17	Jan. 13	16
B June 5	Oct. 28	21	Feb. 17	16
C June 15	Nov. 25	23	Mar. 24	17
D June 25	Dec. 9	24	Apr. 7	17
E July 5	Dec. 30	25	Apr. 21	16
F July 15	Dec. 30	24	Apr. 21	16
G Aug. 5	Jan. 27	25	May 12	15

How to Get the Most from Your Cooling System

by H. R. Bohannon

The most important measurement of the operation of a fan-pad system is the air temperature rise through the house from the pad to the fans. If the temperature rise is too high, the system obviously is not working effectively. The first thing to check is the method of temperature measurement to know accurately what the temperatures are. Ordinary thermometers read an average of radiant temperature and the air dry bulb temperature. The radiant temperature effects must be eliminated or minimized to read true air temperature. Of course, the thermometer must be shielded from sunlight and radiation from the hot glass to get an accurate reading. Do not shield it too tightly or no air can get to it and it will also read too high. A sling or aspirating psychrometer will give the best reading because the high air velocity will tend to mask the radiant temperature effects. Also, be careful not to get water droplets or mist on the thermometer bulb at the pad end or you will read the wet bulb temperature instead of the dry bulb temperature. Much discussion of greenhouse cooling has been the result of temperature measurement made without sufficient care to get true temperatures.

Where the temperature rise through the house is too high, with proper measurements, it is usually due to an inadequate amount of air, or excessive leakage. Inadequate airflow is the result of the house being underfanned, or the fans not running properly. The fan speed should be measured with a tachometer. If it is low compared to the manufacturer's recommended speed, you are losing airflow in the same proportion as the fan speed. If the fan runs at half speed, you are getting half the airflow. Low fan speed is due to low voltage or loose belts. Voltage at the motors can be checked with a voltmeter and should agree with the motor nameplate. Belt tension should be just tight enough to prevent slipping, but not excessively tight. When you can move the belt between the pulleys up and down an amount equal to the thickness of the belt with a reasonable pressure, the tension is about right. Do not attempt to speed up a fan to get more airflow by changing pulleys as you will probably burn up the motor. If you increase the speed 10%, you will increase the motor load by 30%.

Excessive leakage can also cause a high temperature rise through a house. Some

leakage is normal, probably more than most people are aware of, but the system is designed for this and it will cause no trouble. The house should be kept as tight as possible with broken glass replaced, doors kept shut, etc. Excessive leakage is usually caused by the pads being too small or too dense. Too dense pads are the worst offenders and are often installed to increase pad efficiency. While the pad efficiency is increased slightly, the pad resistance is increased drastically, which increases the air leakage a great deal. The pad design should be balanced with attention given both to pad efficiency and air resistance. Prefabricated pads are better in this respect and are usually more uniform. A two inch thick pad is about the best compromise.

Shade also affects the temperature rise through a house but the exact effects are not presently known. However, apparently a very light shade reduces the light intensity very little, but reduces the heat input substantially.

Internal airflow also affects the performance of a cooling system, and again all the details are not known. In general, keep the cool air down on the plants, with baffles if need be, and take particular care not to deflect the air from the pad upwards as it comes in the house. If it hits the hot roof it can heat up very quickly.

One final word: the temperature rise varies from hour to hour and from day to day depending on the sun and outside conditions. It is more at 1:00 pm than at 9:00 am; more in July than in September; and more on a hot day than on a cool day. While the cooling system must be able to carry a peak load, you are more interested in average conditions, so check this temperature rise at several times during a day instead of measuring it just once. Also, be careful not to compare two houses with measurements made under widely different outside conditions.

While air temperature rise is not the only factor in greenhouse cooling, it is a very important one and by checking it accurately and locating your troubles you can get more out of your cooling system.

Mr. Bohannon is Vice President in charge of engineering for the Acme Equipment Company of Muskogee, Oklahoma. This is a part of his talk at the recent Colorado Florist Conference.

your editor
W D Holley

COLORADO STATE FLOWER GROWERS ASSOCIATION
OFFICE OF EDITOR
W. D. HOLLEY
Colorado State University
Fort Collins, Colorado

FIRST CLASS