Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A AND M COLLEGE

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

Bulletin 86 January and February 1957

1957 Colorado Florist's Conference - - March 19, 20 and 21

The first day's sessions will be held at Fort Collins. The other sessions will be held at Writer's Manor on Colorado Boulevard, Denver.

Besides our research staff at Fort Collins we will have as guest speakers:

Dr. Gustav A. L. Mehlquist of the University of Connecticut.

Vic Ball of Geo. J. Ball, Inc., West Chicago, Illinois.

Norman Augsburger, Sales Engineer for Acme Equipment Co., Muskogee, Oklahoma.

Wm. E. Gunesch of Park Floral Company, Englewood.

And a panel on greenhouse cooling and ventilating made up of:

Charles Graul, Jr., Graul Bros. Greenhouses, Wheatridge.

Herman Oliner, Oliner Bros. Greenhouses, Englewood.

H. E. Peterson, Peterson s Greenhouses, Denver.

A program will be in your hands shortly.

Some Factors Which Influence Soft Growth

by W. D. Holley

At this time each year more problems of growth "softness" arise than at any other time. The causes of this softness or weak-stemmed flowers are many and they work together to cause varying degrees of the malady.

December and January give us the least sunlight. Fig. 1 shows the average solar energy recorded at Boulder, Colorado, for 4 years. Sunlight is a great cure for weak stems and soft growth.

December, January and February are our coldest months. This means that we are able to ventilate our greenhouses much less than at most other times of the year. During many days of winter the temperature is allowed to go higher than it should. We are all guilty of this infraction of the rules of growing. These high temperatures

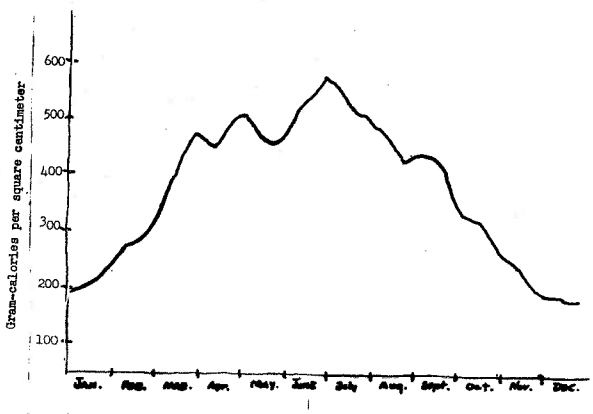

Fig. 1. Solar and sky radiation at Boulder, Colorado; weekly means of daily totals--4 years data. Adapted from Michigan Tech. Bul. 222.

coupled with limited light force elongation of stems without a corresponding increase in dry matter accumulation. Stretch the same amount of stem over a greater distance and it is weakened.

Let us also consider the cropping pattern which we presently attempt with carnations. We strive to have every plant producing at top speed for November and December. Plants so loaded with flowers at a time when light is decreasing is the demand of our market, but the quality of our growth begins showing a reaction to this heavy load of flowers shortly after half the crop is cut. The heavier plants are loaded with flowering stems and the closer this yield is bunched, the greater the ill effects on the plants. We have all seen two year plants which were cut back in June and flowered heavily in January. Often the crop is hardly worth cutting. Too many flowers are produced in too short a time with too little light available. Fig. 2 illustrates what we believe is the normal quality curve for a second crop of carnations produced in midwinter. The grade of flowers was limited by stem length until November 25, at which time flowers were no longer cut to breaks. Note the average grade was high until the week beginning with January 13. This point was less than half way through the second crop of flowers.

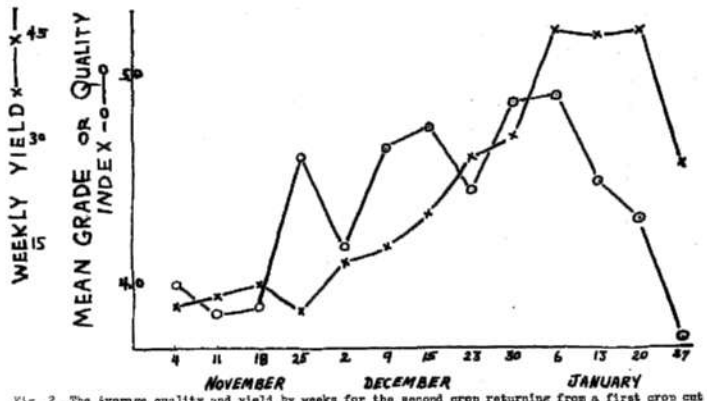

Fig. 2. The Average quality and yield by weeks for the second crop returning from a first crop cut in September.

Which were the fancy grade flowers on this crop? The top breaks left when the first crop was cut. The second breaks produced standard grade flowers and some shorts, and the third breaks (where present) are now producing many shorts and a few flowers so weak they are unsaleable. Air conditioning can possibly be blamed for some of this for these plants actually produced two flowers per square foot for three straight weeks in January -- at a time when light was at its lowest ebb. Was this second crop larger than normal? Probably. Did air conditioning in the summer and fall make the crop larger? Probably, but more observations are necessary before we know this for certain.

Jan.–Feb. Return Crop from First Crop cut in September

Another point of note is the general curve of average grade usually harvested in Colorado. From cut records extending back as far as 1952, the monthly average grade was estimated and plotted (Fig. 3). Mean grade is low in early fall because so many young plants are coming into production. Grade increases slowly from October to December, drops in January, then starts a steady climb until April, dropping slightly in May, and June.

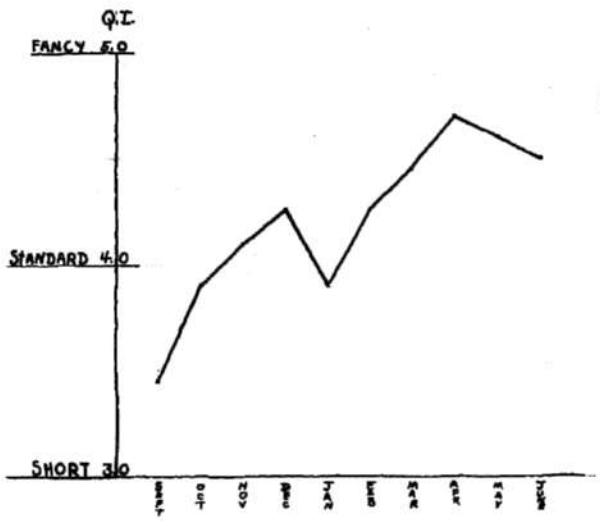

Fig. 3. Estimated monthly average grade of carnations harvested in Colorado.

Potash Hunger

Another factor which causes weak stems and soft growth is potash hunger. When potash levels are optimum (25-35 ppm), and the stems are still weak, look for other causes. The addition of more potash does not help.

Water Relations and Soil Aeration

Water is an important contributing factor to soft growth. Soft plants are actually high in water content -- low in percentage of dry matter. When the soil or medium is perfectly aerated, plants tolerate frequent applications of water because the roots can get all the oxygen they require. On the other hand most soils are not per-- fectly aerated. The tighter the soil the more carefully it must be irrigated to prevent soft growth, especially when other factors are contributing to this soft growth. Herein may lie what could be called a psychological factor. With some of the present methods of irrigation it's too easy to apply water. If we have to drag a hose, we often wait another day or two between irrigations.

The use of a few tensiometers will let us know in short order just how wet we are keeping the soil. A tension of 9 to 15 inches is an optimum range for carnations in most soils. This is roughly equivalent to Lark tensiometer readings of 30 to 50. Table 1 shows the effects of growing Wm. Sim carnations two years at moisture tensions through the wet range. This is adapted from work done at Colorado A & M from 1949 to 1951, when a slightly different grading system was used. The negative difference in the standard grade and the positive difference in the special grade (30 grams and up) were highly significant when analyzed statistically. By watering the plants at a moisture tension of 9 inches, the overall quality was improved (Colo. Flw. Gro. Bul. 27). The total yield was higher for the high moisture (3 inches of tension) plots but this increase came mostly in split, short, and standard grades.

Further work on soil moistures in 1952-53 (Colo. Flw. Gro. Bul. 46) showed that moisture tensions of 9 and 15 inches produced equally good plants. When plants were irrigated at a tension of 21 inches, the grade of flowers was impaired. Table 2 shows the distribution of flowers harvested in the various grades and the quality index or mean quality between the 9 and 15-inch tensions is not significant. The differences between these two tensions and the 21-inch tension are highly significant. A mean grade of 4.50 is obtained when half the flowers are standard and half are fancy grade. This is a very good average for midwinter.

Table 1. The effects of 3 soil moisture levels on yield and grade of William Sim carnations.

Moisture tension	Grade Split	Short	Stand-ard	Fancy	Spe-cial	To-tal
3 inches (Lark 10)	355	139	1769	3348	1912	7524
6 inches (Lark 20)	316	112	1531	3214	2050	7222
9 inches (Lark 30)	253	114	1397	3142	2206	7112

Table 2. The effects of 3 soil moisture levels in the drier range on yield* and grade of White Sim carnations.

Moisture tension	Grade Split	Short	Stand-ard	Fancy	Mean grade or Q. I.
9 inches (Lark 30)	7	50	108	165	4.61
15 inches (Lark 50)	5	66	90	161	4.53
21 inches	5	72	49	126	4.35

*Yield records for the months of December, January and February.

If plants have been irrigated too frequently, they do not have an extensive root system. They must be accustomed to higher moisture tensions gradually. When a tensiometer is placed in a soil that has been kept too wet and the plants allowed to reach the wilting point, the tension registered can be considered as slightly above that at which water has been applied previously. If the tension registers 4 inches at wilting, the chances are pretty good that the

soil has been irrigated at about 3 inches of tension. In order to accustom these plants to irrigation at a tension of 9 to 15 inches, they must be watered each time just as they begin wilting. This wilting will start each successive time when the soil gets a little drier. As the plants become accustomed to this drier soil, the percentage of dry matter in the tops rises and the softness of growth begins disappearing.

Summary

Several factors work hand in hand to cause soft growth of greenhouse crops in midwinter. Not a lot can be done to remedy the poor light conditions prevailing at this time. We can regulate our temperatures carefully to avoid excesses day or night. We can ventilate the houses to prevent them from heating above 65 degrees during the sunny days of January and early February. We should understand that some weakness is a natural reaction of plants to heavy cropping or crowding. A lot of judgment and careful thought must go into how and when we irrigate so that some check is placed on the water content of the plants.

Literature cited:

Crabb, Geo. A. Jr. Solar Radiation Investigations in Michigan. Michigan Tech. Bul. 222. 1950.

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