Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A & M

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

Bulletin 49 November 1953

The Effect of Light Intensity on the Quality and Production of Better Times Roses

by

Roger Farmer and W.D. Holley

One of the problems which confronts rose growers is poor quality in regard to color, stem diameter, and substance during the summer and for temporary periods during the spring and fall months. Since light intensity is at its maximum during these periods, the possibility arises that excess light intensity may contribute to poor quality. In the Colorado area the mean light intensity is greater than in many other flower-growing areas, consequently high light intensity presents a problem here that is of minor importance in other sections. This investigation was set up to determine the effects of various light intensities on the color, stem length, stem diameter, and production of Better Times roses.

Two-year-old rose plants of the Better Times variety selected at random from commercial stock, were used in this experiment. Before each experimental year, the plants were pruned by the "gradual cutback" method. The pruning operation was begun on July 17, 1950 and May 18, 1951. Each new shoot "breaking" from the pruned plants was soft-pinched once and then allowed to flower. This method of pruning allowed a fairly uniform continuous cut which was desired for this study. Two 5-leaflet eyes were left on each cane as the flowers were cut.

The light intensity treatments from November 6, 1950 to June 25, 1951 were (1) greenhouse glass, (2) 1 thickness of cheesecloth, and (3) Aklo-hammered glass. Aklo-hammered glass is a Libby-Owens-Ford product which is used in the building trade for screening out a portion of the heat rays from sunlight. The light intensity treatments from August 1, 1951 to June 15, 1952 were (1) greenhouse glass, (2) 1 thickness of cheesecloth, and (3) 3 thicknesses of cheesecloth. The greenhouse glass treatment was the control treatment for both years and all plots were under greenhouse glass as well as any other shading materials used.

IN THIS ISSUE

The control, 1 thickness of cheesecloth, and 3 thicknesses of cheesecloth affected only the light quantity in the visible and infra-red regions and did not affect the light quality. Aklo-glass, however, affected both the light quantity and quality in the visible and infra-red regions. In the visible region the per cent transmission of the various materials was greenhouse glass - 89.98, 1 thickness of cheesecloth plus greenhouse glass - 49.93, and 3 thicknesses of cheesecloth - 24.11. The transmission of visible light for Aklo-glass averaged 49.69 per cent, but it transmits more of the rays of medium length and considerably less of the longer rays than one thickness of cheesecloth. Aklo-glass also transmits only a small percentage of the infra red energy.

The experiment was set up in 4 randomized blocks and so designed that the 9-foot shading structures did not shade adjacent plots between the hours of 9 a.m. to 3 p.m. at any time of the year. The upper one-third of the plants, which included the flowers and most of the foliage, was shaded. Each plot occupied 12 square feet of bench area and contained 12 plants.

Stem length, stem diameter, production, and color intensity were recorded daily for the 2 years that the experiment was conducted. Stem diameter was measured with calipers graduated to one thirty-second of an inch. Color intensity of the rose was determined by matching the flowers with spinning color discs of various color gradations. Through the cooperation of Dr. L. W. Durrell, Colorado A & M College, Botany Department, deep rose pink and carmine as shown by Ridgway, were found to be the two basic colors in the Better Times rose. The range of colors between these two extremes was obtained by spinning known amounts of these two colors which blended them into a solid color. Eight discs representing 8 color gradations were used. The amounts of each color present were as follows:

Disc No.	Deep rose pink	Carmine
1	100%	0%
2	75%	25%
3	50%	50%
4	33%	67%
5	25%	75%
6	10%	90%
7	5%	95%
8	0%	100%

All color records were taken in a darkened room using a 20-watt fluorescent lamp as a constant light source. The rose color refers to the disc number. Colors 1, 2 and 3 were considered sufficiently "off-color" to be graded as "work" roses. Color desirability increased as the color number increased. Color measurement was made by the same person for practically all records.

The temperature under the various treatments was recorded from April 26, 1952 to June 15, 1952. Since the night temperatures were the same, a mean 8-hour temperature was calculated from 8 a.m. to 4 p.m. The mean daily temperatures were as follows: 1 thickness of cheesecloth - 83° F, control - 82° F, and 3 thicknesses of cheesecloth - 80° F.

RESULTS

Records were analyzed by monthly periods, since natural light intensity varies so greatly from one period of the year to another. An extremely boiled down version of the voluminous results is presented in Tables 1 and 2. If differences occurred due to time of the year, they will be mentioned.

There was very little difference between one thickness of cheesecloth and the control, or unshaded treatment, in any of the characters studied. No differences were great enough to be significant.

The aklo glass treatment was significantly detrimental to stem diameter, color and production (Table 1). This glass transmits an average of about 50 per cent of the visible light, however it transmits less of the orange and red rays and more of the green and blue rays than ordinary glass. It also screens out much of the infra red energy. These data imply that infra red may be essential to good color formation in red roses.

Three thicknesses of cheesecloth was detrimental to stem diameter and production but did not significantly affect color or stem length.

Table 1. Effects of various shading structures during 1950-51 season.

	Ave. stem length in inches	Ave. stem dia. 1/32 inches	Ave. color	Ave. production per plant
One cheesecloth	14.98	5.74	4.26	17.6
Aklo glass	14.64	5.48	3.61	14.9
Control	14.89	5.79	4.32	17.4

Table 2. Effects of shading structures during 1951-52 season.

	Ave. stem length in inches	Ave. stem dia. 1/32 inches	Ave. color	Ave. production per plant
One cheese-cloth	14.25	5.53	4.48	27.2
Three cheese-cloth	14.48	5.30	4.45	23.9
Control	14.13	5.49	4.32	28.7

The greatest stem length, the largest stem diameter and the highest production occurred during the spring and fall months. The best color was obtained during the late winter and early spring months. The poorest color occurred during January and August. The best came in February, March and April, decreasing to some extent in May and June.

High light intensity did not cause weak stems and poor flower color and substance. On the other hand, the higher temperatures accompanying such light intensities are no doubt detrimental to these flower characteristics. These data indicate that light intensity may be reduced by 50 per cent without injury to the rose plants. This reduction in light may be used to good advantage in lowering the temperature. The ultimate answer to this problem of poor quality roses during the summer months may well rest in better temperature control with full light intensity.