



IN COOPERATION WITH COLORADO STATE UNIVERSITY
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Effect of Plant Density on First Year's Production of Carnations

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A range of three to six carnation plants per square foot may be found in the Denver area. Some benches are replanted every year while others are grown for two or more years. A combination of optimum time grown and planting density needs to be developed.

Bunt (2) has done some work on plant densities (CFGGA Bulletins 239 and 249) in England. However, it should be noted that during the months of November through February an average of 80 cm cal/cm²/day of solar radiation is received in England (1) while Colorado receives an average of 240 gm cal/cm²/day during the same time period (3).

Several planting methods are used in the carnation industry ranging from the Weirich to double planting in the center. For simplicity, this experiment used equal spacing across the bed for all densities, but varied the distance lengthwise.

Materials and Methods

CSU Linda was planted July 14, 1973, in a 36-inch wide, north-south, bench of Idealite in a fiberglass greenhouse at densities of two, three, four, five, and six plants per square foot. Six plants were planted per row with the distance between rows being varied to give the desired density. Each density was randomly

repeated four times, 36 plants per plot with a four row buffer between each replicate.

Data taken were date of cutting the flower, grade of the flower, and location from which the flower was cut with respect to row position across the bench and density.

The data were analyzed in seven 5-week periods covering all flowers cut up to the time when the plants were one year old. First flowers were cut the week of November 12, 1973.

Results

Increasing density caused yield per plant to decrease (Table 1). While yield per plant was decreasing, yield per square foot was increasing. This was because the loss in yield per plant was more than offset by the increased number of plants in the higher densities. A breakdown of the quality of flowers cut from the different densities is given in Table 2.

Plants were lighted for a Christmas crop. This caused marked reduction in yield and quality of flowers after the first crop was cut (Figs. 1 & 2), with a very slow return to production. (See also CFGGA Bulletin 257.) The mean grade for all densities of the 5-week period following the Christmas crop was less than 3.0 (short).

A significant difference was found in the yield of flowers between the outside rows and the inside rows,

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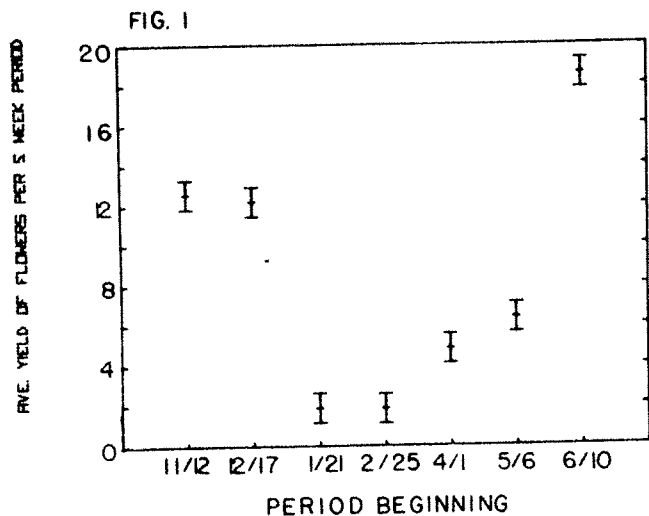


Fig. 1. Average yield per six plants, all densities combined, for each 5-week period starting November 12, 1973. Vertical bars are confidence limits. Where the bars do not overlap, the average values are significantly different from each other with a 5% chance of the results being in error.

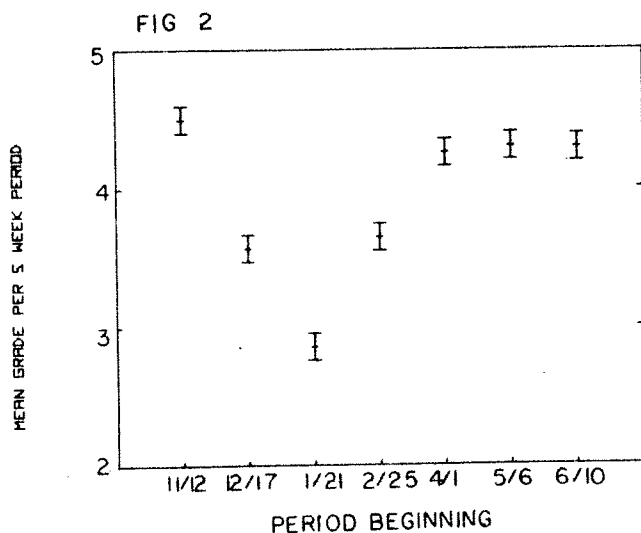


Fig. 2. Mean grade of carnations, all densities combined, for each 5-week period starting November 12, 1973.

especially as the plants got older (Fig. 3). This effect was not observed for mean grade.

The results are for first year's production, and show a definite advantage for higher planting densities. Whether these high densities will continue to show the same advantage in the second year remains to be seen.

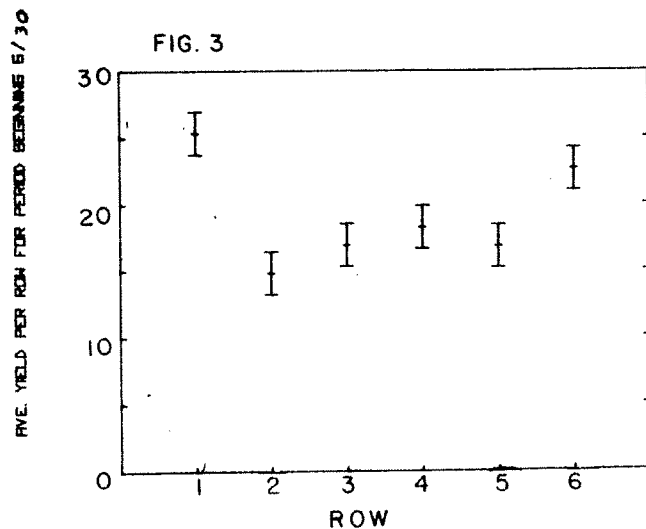


Fig. 3. Average yield of carnations by row, all densities combined, row one on one side of the bench and row six on the opposite side, for the 5-week period beginning June 10, 1973.

Table 1. Yield of carnations for one year, planted at different densities, 35 weeks beginning November 12, 1973.

Density plants/ft ²	Yield per plant	Yield per square foot
2	12.03	24.0
3	11.15	33.4
4	9.60	38.4
5	7.78	38.9
6	7.95	47.7

References

1. Anon., 1961. Meteorological Records, Lee Valley Exper. Hort. Sta., Report 1960 and 1961, Hoddesdon-Hertfordshire, England, p. 123.
2. Bunt, A. C., "An Attempt to Define the Economical Optimal Planting Density for Carnations," *Rep. Glasshouse Crop Ass. Inst.*, 1969 (1970), pp. 160-165.
3. Holley, W. D., *Syllabus for Greenhouse Management*, 1970, p. 8.

Table 2. Grade and number of flowers per grade produced during first year carnations at different planting densities, 35 weeks beginning November 12, 1973.

Density	Mean	% of				No. of flowers produced/ft ²			
		Fay	Std	Sht	Den	Fay	Std	Sht	Den
2	4.17	60	24	7	9	14.4	5.8	1.7	2.2
3	4.03	59	19	11	11	19.7	6.4	3.7	3.7
4	3.89	50	28	13	9	19.2	10.8	5.0	3.6
5	3.74	43	30	13	14	16.7	11.6	5.0	5.4
6	3.78	41	31	15	13	19.6	14.8	7.2	6.2