IN COOPERATION WITH COLORADO STATE UNIVERSITY
H. A. Lazier, Executive Secretary
Bulletin 104 909 Sherman, Denver, Colorado September 1958

Response of Carnations to Different Rates of Liquid Feeding

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Work by John White (CFGA Bul. 95) showed salinity to impair quality and yield of carnations and recommendations were made that the lowest possible salt content of soils consistent with good fertility should produce the best yield and quality of carnations. With this in mind, an experiment was designed whereby lower rates of irrigation water treatment were compared with rates most frequently used at CSU and among commercial growers in Colorado. Possibly less fertilizer could be added to the water and achieve the same or better results.

Sixteen randomized plots were planted with rooted cuttings of Crowley's Pink Sim on June 19, 1957. Each plot contained 35 plants of Pink Sim at 6 by 8-inch spacing and one buffer row of the variety Mamie. Plots were also separated by wooden boards to minimize the mixing of soil solutions. The plants were grown with one and one-half pinches to get reasonably steady production. Untreated water was used for irrigation until August 1.

Four plots at random were irrigated with each of 4 nutrient solutions from August 1 until the experiment was terminated the following May 31. The following amounts of salts were added in 20 gallons of stock solution then diluted 1 to 34, by means of a Model PR Fertoject machine, as water was applied to the plots. All amounts are in grams per 20 gallons.

	Soln. 1	Soln. 2	Soln. 3	Soln. 4
Calcium nitrate	2275	1820	1365	910
Muriate of potash	595	476	357	238
Epsom salts	225	180	135	90
Sodium nitrate	120	96	72	48

Solution 2 is approximately the basic rate of treatment of irrigation water at Colorado State University for the past seven years. When diluted for irrigation use, the water contains 578 ppm nitrates, 178 ppm calcium, 100 ppm potash, 10 ppm sodium, 58 ppm sulphates and 90 ppm chlorides. This differs from the CSU basic solution in having calcium nitrate instead of ammonium nitrate and in containing 25% less potash. Solution 1 was 1 and 1/4 times the strength of S2 (basic soln.) while S3 and S4 were 3/4 and 1/2 strength. Adequate treble superphosphate was added to the soil before planting.

Flowers were cut from November 10 to May 31 and graded by weight, length and appearance into the 4 Colorado grades. A summary of yield and grade per treatment appears in Table 1. The differences in yield and mean grade between S1 and S2 were not great enough to be significant statistically. Both 3/4 and half strength solutions reduced grade and yield. Hunger signs were plainly visible on plants in S4 plots by early winter and visible on the S3 plots during the spring. At no time did the appearance in the S1 and S2 plots differ markedly.

Table 1. The yield and grade of Pink Sim carnations watered with four strengths of nutrient solution.

		Grade				Total yield
Nutrient level	split and design	Short	Standard	Fancy	Mean Grade	
Sol.1	76	31	685	298	4.11	1090
Sol.2	67	51	756	248	4.06	1122
Sol.3	90	37	724	186	3.97	1037
Sol.4	102	44	677	96	3.83	919
Minimum differences required for significance with chances of 19 to 1.					.14	67

Discussion

The potash levels may not have been adequate for plants in this experiment nor in balance with nitrates. However, no potash deficiency symptoms were observed on the foliage at any time. There was no indication that nutrient solutions below the basic (S2) level should be used. Total soluble salts in all plots were low throughout the year. Solubridge readings as high as 25 with a 1 to 5 dilution were rare.

Regular soil tests also revealed that nitrates and potash were difficult to maintain at levels customarily sought when fertilizers are applied dry. The 1 1/4 basic solution was the only one that maintained nitrates at 25-30 ppm Spurway, yet growth was just as good from the basic solution where nitrate levels dropped to 2-5 ppm. Potash tests were inadequate in all plots, if earlier dry feeding levels are used for comparison.

The question foremost seems to be: with well drained soil and constant liquid feeding, is there not a better way to determine the nutritional status of a plant than soil testing? This along with further comparisons of basic and higher strength solutions are subjects for current research being conducted at CSU.

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