The Response of Carnation Varieties William Sim and White Patrician to Various Levels of Nitrates and Soil Moisture

-- by W. D. Holley David L. Wagner and Roger Farmer[1/]

(Continued from Bulletin 26)

In an attempt to determine a range of optimum levels or combinations of levels of soil moisture and nitrates for carnations, the varieties William Sim and White Patrician were grown for two years at nine different moisture-nitrate combinations. The details of the experimental design and the effects of moisture and nitrogen on total production were presented in Bulletin 26.

Since White Patrician has a tendency to produce special and split flowers and few intermediate grades during the winter period, the data analyzed for effects on quality of production are for William Sim only. White Patrician gave similar results but to a less marked degree.

As the flowers were cut they were stripped of side growths and all except splits were weighed on a dietary scale in grams. The weight categories taken to correspond to the various grades used in Colorado were as follows:

15 grams and less--short
16 to 22 grams-----standard
23 to 29 grams-----fancy
30 grams and up----special

The Effect of Moisture on Quality of Growth

The average number of blooms produced in the five grades by three moisture levels is presented in table 4. The figures are average for five randomized plots of 63 plants each, watered at the same moisture level for two years.

Table 4. The effect of moisture level on quality of production of William Sim for two years.

Moisture Level	Split	Short	Standard	Fancy	Special	Total
High	71.0**	28.0	353.8**	669.6**	382.6	1505.0
Medium	63.2	22.4	305.8**	642.8	410.0**	1444.2
Low	50.8	22.8	279.4	628.6	441.2**	1422.8

** A difference of 20 blooms is significant with odds of 99:1

1/ The authors wish to acknowledge invaluable assistance from Prof. Andrew G. Clark in the statistical analysis of the results of this work.

In studying the results presented in table 4, we can compare only within grades. Considering only the effects of moisture on the quality of William Sim production over a two-year period, the following is evident:

High moisture produced significaty more splits than low moisture.

High moisture produced more standards than medium moisture and medium moisture produced more standards than low moisture.

High moisture produced significantly more fancies than medium moisture. Medium moisture produced more fancies than low but the difference was not quite significant.

The reverse happened when considering the special grade. Medium moisture produced more specials than high moisture and low moisture produced significantly more specials than either of the other two levels.

The differences in total production were not significant.

The Effect of Nitrates on Quality of Growth

To determine the effect of nitrate levels on the quality of production of William Sim, the average number of blooms produced in the five grades by three nitrate levels are shown in table 5. Each figure is the average for 15 randomized plots of 21 plants each, grown at the same nitrate level for two years.

Table 5. The effect of nitrate level on quality of production of William Sim for two years.

Nitrate level	Split	Short	Standard	Fancy	Special	Total
High	15.9	10.3	103.9*	219.9**	180.3**	530.3
Medium	22.7	7.9	94.4	222.4**	148.5**	495.9
Low	23.1	6.1	114.7**	204.7	82.5	431.1

* A difference of 8.8 blooms is significant with odds of 19:1
** 11.5 blooms are significant with odds of 99:1

Again we can compare only the figures within a given grade. Considering only the effect of nitrate levels on the quality of William Sim flowers cut over a two-year period, we find that:

There were no significant differences within the split and short grades.

Low nitrates produced significantly more standards than high nitrates and a highly significant number more of standards than medium nitrates.

High and medium nitrate levels produced more fancies than low nitrates.

High nitrates produced more specials than medium nitrates and medium nitrates produced more specials than low nitrates.

The differences in the totals in favor of higher nitrate levels are large enough to be significant statistically.

The increase in total production caused by higher nitrate levels was entirely within the two top grades.

The Combined Effects of Moisture and Nitrate Levels on Quality

Table 6 gives the interaction of soil moisture and nitrates and indicates the optimum combination of levels for carnations in Colorado. Each figure is an average production of five randomized plots of 21 plants each, grown at the same nitrate level and watered at the same moisture level for two years.

Table 6. The combined effects of moisture and nitrate levels on the quality of William Sim production for two years.

Moisture level	Nitrate level	Split	Short	Standard	Fancy	Special	Total
	High	18.4	11.6	110.4	223.3	176.4	540.2
High	Medium	26.0	8.8	118.4	238.8	130.6	522.6
	Low	26.6	7.6	125.0	207.4	75.6	442.2
	High	14.4	10.0	103.6	214.6	176.2	518.8
Medium	Medium	26.4	6.6	75.2	217.8	155.2	481.2
	Low	22.4	5.8	127.0	210.4	78.6	444.2
	High	14.8	9.4	97.8	221.8	188.2	532.0
Low	Medium	15.6	8.4	89.6	210.6	159.8	484.0
	Low	20.4	5.0	92.0	196.2	93.2	406.8

The overall interaction between moisture, nitrates and quality of production did not show statistical significance. A comparison of a given moisture and nitrate combination, say high-high, with a different moisture and the same nitrate level, low-high or medium-high, within a grade, will show little difference. In other words, the nitrate levels were exerting most of the influence upon quality of production.

The most valuable information to the carnation grower is contained in the column for special grade and in the totals. High nitrates combined with high, medium or low moisture produced the most top grade blooms. This higher quality was coupled with a significantly higher total production in each case. No one of the three combinations produced significantly different total production or quality. Looking back to table 4, we can see that when all nitrate levels are combined within a given moisture, low moisture actually increased the number of special grade blooms and decreased splits. From an economic viewpoint, either medium moisture and high nitrates or low moisture and high nitrates would seem to be the optimum combinations of these two soil factors for Colorado conditions.

Medium moisture was maintained by watering on a Lark tensiometer reading of 20 or approximately 6 inches of mercury tension.

Low moisture was maintained by watering on a Lark reading of 30 or approximately 9 inches of mercury tension.

High nitrates were maintained by feeding with 20 pounds of ammonium sulfate per 100 square feet of bench area per year. CAUTION--Not all soils should be fed with ammonium sulfate, especially to the exclusion of other nitrogen fertilizers. The soil used in this study was a sandy-clay loam with a pH of around 7.5. This would not materially change the nitrogen requirement but it did determine the form of nitrogen fertilizer used. Each grower should use the fertilizer recommended for his particular soil. To convert any nitrogen fertilizer to a rough equivalent of ammonium sulfate, see Colorado Flower Grower's Association Bulletin 26, p.3.

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High nitrates were not detrimental to the keeping quality of the flowers. This material and other data from this study will appear in Bulletin 28.

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A Step in the Right Direction

Congratulations to Cliff and Mary Karstedt of the Avenue Flower Shop, Denver, in their farsightedness in opening two new cash-and-carry flower stores. They have given careful study to the location of these stores. We wish them every success possible. It will be interesting to see if the people of Denver respond. At present they probably use as few flowers per capita as any comparable city.

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Iscothane Injury

Recently our attention was called to roses which had developed a serious rusty appearance on the undersides of the leaves. Upon close examination we found the cells of the leaves to be proliferated and corky. All gradations of this injury were in evidence from merely a dirty appearance to severe corking over of the cells.

This injury had been caused by Iscothane---either an overdose or by spraying the material on with very high pressure. We are using four ounces of Iscothane to 100 gallons of water and spraying with around 150 pounds of pressure. Upon the advice of one grower we also spray when weather conditions are such that the plants dry quickly. We still get slight injury even with these precautions.

Iscothane is powerful stuff so measure it accurately and avoid beating the plants with high pressure nozzles at close range.

Your editor,

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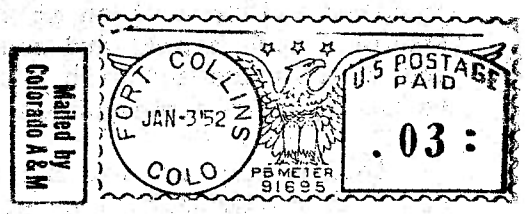

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