

## A QUICK LOOK AT SLOW-RELEASE FERTILIZERS

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Lunt and several of his colleagues in California have studied the effects of slow-release fertilizers on chrysanthemums. They successfully grew potted mums to maturity, with a single pre-plant application of fertilizer.

The advantages of one-shot applications of fertilizer are obvious and have been widely publicized. However, some of the treatments have been unsatisfactory and the search for satisfactory materials has been extensive. The coated fertilizers made by the Archer Daniels Midland Company are a result of this search. They have been able to control the rate of release of nutrients by controlling the thickness of the coating, and the duration of the fertilizer can be adjusted to the desired duration of the crop.

The use of slow-release fertilizers on potted mums was investigated at North Carolina State College this spring and summer. Chrysanthemum cuttings were donated by Yoder Brothers, Inc., of Barberton, Ohio, and the Archer Daniels Midland Company of Minneapolis, Minnesota, supplied the slow-release fertilizers.

### Materials and Methods

Rooted cuttings of the varieties Red Star, Jackstraw, Mercury, Snowclad, and Sundial were planted in 6-inch clay pots on May 10, with 5 cuttings in each pot. The plants were pinched and shaded on May 24.

Included in the study were soils from commercial greenhouse ranges in Raleigh, Wilmington, and Charlotte, as well as the soil mixture generally used in floriculture studies at N. C. State College. Dolomitic limestone and superphosphate were incorporated into the soil mixtures for all treatments.

The fertilizer treatments were:

1. 15-7-7 slow-release, 10 grams/pot.
2. 17-8-4 slow-release, 10 grams/pot.
3. Check - plants fertilized weekly with alternating applications of 20-20-20 and  $\text{KNO}_3$ , at a rate of 2 1/2 lbs./100 gals. water.

No additional fertilizers were ever applied to the plants in the slow-release fertilizer treatments.

The variety Red Star was used in the studies in which the three fertilizer treatments and four soil sources were compared. The other varieties were only used in N. C. State College soil, in which only the fertilizers were compared.

Only one cutting was used per pot in the Charlotte soil, so no attempt will be made to compare the Charlotte treatments with the other soil-source treatments.

Soil tests were made at approximately three-week intervals during the study. Soil and leaf samples were also collected at the conclusion of the study and analyzed by the State Soil Testing Lab and the Service Laboratory, respectively.

## Results

The final soil test readings are shown in Table 1. The average number of flowers per pot and the average plant height are also shown in Table 1.

Table 1. Soil test readings at the conclusion of the study (July 30). The plants were potted May 10, and the slow-release fertilizers were applied at that time.

Treatment	Parts per million of various nutrients					Soluble salts (mhos)	Average number flowers	Average plant height (inches)
	N	Ca	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg			
N.C.State								
15-7-7	1	570	22	22	135	24	13.8	13.0
17-8-4	6	685	36	32	180	48	13.2	12.8
Check	29	1240	180	202	280	34	14.2	12.8
Raleigh								
15-7-7	3	3200+	200	36	575	90	16.3	14.5
17-8-4	9	3200+	164	36	435	140	16.3	14.7
Check	60	3200+	200	232+	505	80	16.5	13.7
Wilmington								
15-7-7	1	960	122	22	22	24	15.4	13.2
17-8-4	6	1080	138	36	32	70	14.0	13.2
Check	36	1400	138	232+	47	38	13.4	12.4
Charlotte*								
15-7-7	39	1210	200	57	200	200	5.3	13.0
17-8-4	71	1400	240	61	135	190	5.3	13.0
Check	46	3200+	256	232+	280	55	6.2	13.0

\* Only one plant/pot, while all other soil sources had five cuttings/pot.

The tissue analyses are shown in Table 2. Leaves and stems were collected on July 30, 1962.

Table 2. Tissue analyses of plants grown in four different soils, with three fertilizer treatments. Plants of the variety Red Star were planted May 10, pinched and shaded May 24.

Treatment	Per cent of various nutrients			
	N	CaO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
N. C. State				
15-7-7	2.66	1.51	0.91	1.35
17-8-4	3.00	1.48	1.14	1.00
Check	3.39	1.79	1.39	6.25
Raleigh				
15-7-7	2.21	1.68	0.72	1.30
17-8-4	3.67	1.71	1.21	1.70
Check	3.22	1.96	1.01	6.20
Wilmington				
15-7-7	2.38	1.60	1.15	1.60
17-8-4	4.76	1.74	1.60	1.60
Check	3.22	1.90	1.13	6.00
Charlotte				
15-7-7	4.37	1.96	2.04	3.65
17-8-4	4.23	1.57	1.88	5.15
Check	3.47	2.13	1.39	6.80

The results of the various treatments are also shown in Figures 1, 2, 3, and 4.



Figure 1. Plants of the variety Red Star, treated with 15-7-7, check, and 17-8-4, and grown in the N. C. State College soil medium.



Figure 2. Plants of the variety Red Star, treated with 15-7-7, check, and 17-8-4, and grown in the soil medium of a commercial range in Raleigh.

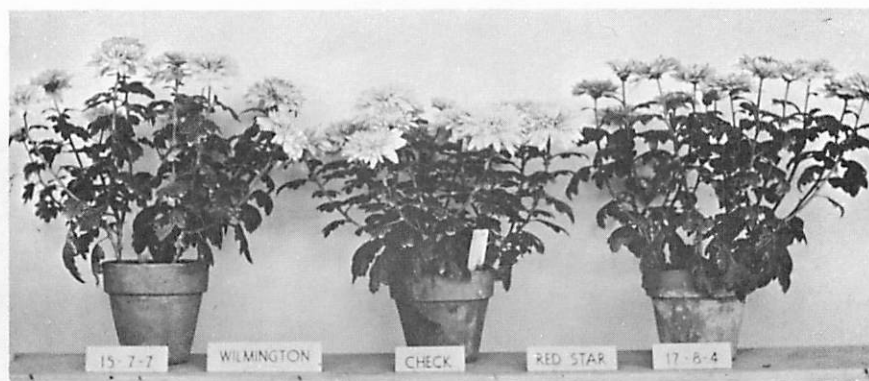


Figure 3. Plants of the variety Red Star, treated with 15-7-7, check, and 17-8-4, and grown in the soil medium of a commercial range in Wilmington.



Figure 4. Plants of the variety Red Star, treated with 15-7-7, check, and 17-8-4, and grown in the soil medium of a commercial range in Charlotte. Only 1 cutting was planted per pot in this soil.



The foliage was dark green in color in all treatments. Plants in the check treatment flowered earlier than plants in either the 15-7-7 or 17-8-4 treatments. This was true for all soil types. This difference in time of flowering is evident in the photographs.

## Discussion

### Soil tests

According to soil test analyses shown in Table 1, nitrogen, calcium, phosphorous, and potassium were generally highest in the check treatments at the conclusion of the study. Chlorosis was never evident in any of the treatments, however.

The soluble salt readings were generally the same for all treatments, with the exception of the Charlotte soil. In that soil the soluble salt reading was 200 mhos in the 15-7-7 treatment and 190 mhos in the 17-8-4 treatment. The check treatment had a soluble salt reading of only 55 mhos. Previous tests in the study indicated a similar pattern for the Charlotte soil. At soluble salt levels of 190 to 200 mhos, one could expect some injury, but the plants in these treatments appeared normal, without any typical excess salts symptoms. The effects of coated fertilizers on soil test readings warrant further investigation.

### Tissue analysis

The results of the tissue analyses, present in Table 2, do indicate that the leaves and stems removed from plants grown in Charlotte soil were frequently higher in N, CaO,  $P_2O_5$  and  $K_2O$  than in other treatments. Only one cutting was planted per pot in this soil so comparisons with other soil sources cannot be readily made.

The lowest nutrient levels were frequently obtained in the 15-7-7 treatments, but none of the plants were chlorotic.

### Plant characteristics

The tallest plants occurred in the 17-8-4 treatment, Raleigh soil source, in which the plants averaged 14.7 inches. The shortest plants were in the check treatment, Wilmington soil source, in which the plants averaged 12.4 inches. The differences in height within the same soil source treatment were slight.

The most floriferous plants were produced in the Raleigh soil treatment, and the number of flowers was practically the same for all three fertilizer treatments in that soil. The largest differences in number of flowers occurred in the Wilmington soil in which the plants in the 15-7-7 treatment averaged two more flowers per pot than in the check treatment.

The foliage was dark green in all treatments. Differences in flower color could not be accurately judged as there were pronounced differences in the time of flowering, as previously mentioned.

## Conclusion

Potted chrysanthemum plants of good quality were produced under slow-release fertilizer regimes. The slow-release fertilizers were applied when rooted cuttings were potted (May 10), and the plants were not fertilized again (study concluded July 30). Plant height and number of flowers were not affected by the slow-release fertilizers, but flowering was delayed.

The total soluble salt readings were very high in the slow-release fertilizer treatments for one soil source, and further investigations are underway to ascertain the reasons for this effect. Results of studies on the effects of slow-release

fertilizers on Philodendron oxycardium and poinsettias will be reported in this bulletin at a later time.

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