Automatic Watering of Roses 1943--1946

Kenneth Post and John G. Seeley *
Department of Floriculture and Ornamental Horticulture
Cornell University

Earlier experiments (1940-42) on the production of greenhouse roses, watered by various methods, gave no significant difference in production or stem length whether the plants were surface watered at 3 inches of capillary tension, subirrigated to saturation at 3 inches of tension, or automatically watered at either 3 or 6 inches of tension. These results have been presented in Cornell Bulletin 793, Automatic Watering of Greenhouse Crops.

Experimental Methods

To further study the effects of different methods of watering roses the following treatments were made: (1) Surface watering when the soil had dried to a capillary tension of 3 inches (2) Automatic injection watering at 3 inches tension. (3) Automatic injection watering at one inch of tension. Each treatment was replicated three times with the plots randomized throughout the length of the house.

Dormant budded plants of the variety Peters Briarcliff were planted on April 8, 1943 in shallow V-benches containing 6 inches of a Genesee silt loam which had been composted with manure. Each plot was 9 feet long and 3 feet wide with 26 plants per plot planted at a spacing of 12 by 12 inches. The water injection pipe was located in the center of the bench at the end of the plot. Water entered the bottom of the bench and moved to the surface by capillarity in the injection watering method.

Water was injected into the automatically watered plots at the rate of 1/3 of a gallon of water per square foot of bench area at each injection, and none of the water drained from the bench. The surface watered plots received a thorough watering when the soil reached a capillary tension of 3 inches.

Superphosphate (20%) at the rate of 5 pounds per 100 square feet was thoroughly incorporated in the soil before planting and one application at the same rate was made in the spring of each year. Muriate of potash (½ pound per 100 square feet) was applied in the spring of 1945 and 1946. Nitrogen was supplied in the form of ammonium sulphate (1 pound per 100 square feet) or ammonium nitrate (½ pound per 100 square feet). All fertilizer applications were made to the soil surface and washed in by means of a heavy surface watering. The automatically watered plots received no other surface watering except that which fell on the soil when the plants were syringed each week.

For the soil tests a representative sample was obtained twice a month by removing from each plot six cores of soil ½ inch in diameter vertically from the top to the bottom of the bench. Each core was divided into halves, one half representing the upper three inches of the bench and the other half representing the lower three inches. Each six parts were then mixed giving two composite samples for each plot. The samples were air-dried, screened, and analyzed. Nitrates were extracted with the Spurway extracting solution and determined by the phenoldisulfonic method. The results are expressed as parts per million of nitrate in the soil extract.

The plants were maintained in continuous production with gradual cutting back during June and July.

Flowers were cut each morning and graded. In this experiment nearly 27000 flowers were produced on the 234 plants.

TABLE I: EFFECT OF METHODS OF WATERING ON FLOWER PRODUCTION

Treatment	Average no. of Flowers per Plant 1943 - 44 (11 months)	1944 - 45 (12 months)	1945 - 46 (10 months)	Total of Three Seasons
Surface watering at 3 inches	34.5	41.8	36.6	112.9
Automatic watering at 3 inches	34.6	43.1	35.4	113.1
Automatic watering at 1 inch	36.9	45.1	34.0	116.0

TABLE 2: EFFECT OF METHODS OF WATERING ON STEM LENGTH

Treatment	Average Stem Length in Inches 1943 - 44	1944 - 45	1945 - 46
Surface watering at 3 inches	22.3	19.9	17.6
Automatic watering at 3 inches	22.4	20.0	17.9
Automatic watering at 1 inch	22.0	21.1	18.9

RESULTS

Production: The production and stem length are presented in Tables 1 and 2.

No significant difference in rose production occurred when watered on the surface or by automatic injection at the same capillary tension of 3 inches (Table 1). Roses automatically watered at 1 inch of tension gave slightly higher production than other treatments but statistical analysis showed the differences were not significant.

The stem length (Table 2) was practically the same in all treatments.

Nitrate Levels: The results of the nitrate tests for the three plots of each treatment watered at 3 inches of tension were averaged and are presented graphically in Figures 1-3. As noted in previous automatic watering experiments, the trend was for the nitrate content of the upper half of the soil to be higher than the nitrate of the lower half.(refer to Figure 1.) The nitrate content of the upper half, however, did not at any time increase to over 100 ppm. and during most of the three seasons it ranged between 25 and 65 ppm. This is within the range recommended for roses. The nitrate levels for plots automatically watered at 1 inch of tension were similar to those automatically watered at 3 inches of tension.

Note in Figure 2 that in the surface watered plots there was little consistent difference in the nitrate content of the upper and lower halves of the benched soil. Usually the lower half of the soil was slightly higher in nitrate than the upper half, but often the reverse was true and the differences were small.

To determine whether the nitrate content of the upper half of the automatically watered plots was significantly different from that in the surface watered plots, a comparison is presented in Figure 3. It may be seen that the nitrate content of the upper half of the automatically watered soil was sometimes lower and sometimes higher than the nitrate of the surface watered soil, indicating that in general there was little difference in the nitrate levels with the two methods of watering.

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*This project was started and completed by John G. Seeley. It was supervised by J.E. Howland during 1944 and 1945. Fred F. Horton was the grower and Mrs. Iva. E. Piper the soil technician. The plants were donated by Jackson and Perkins, Newark, N.Y. The project was under the direction of Dr. Kenneth Post.

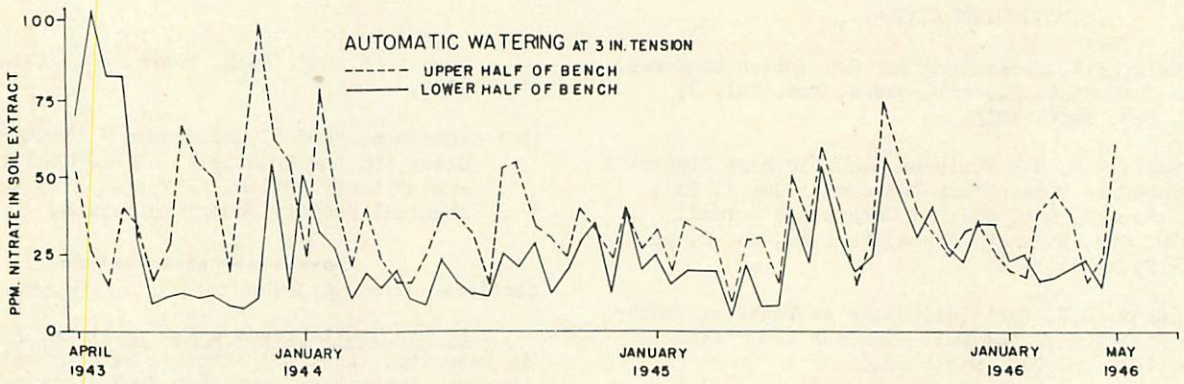

Figure 1. Nitrate parts per million in upper and lower half of soil automatically watered by the injection method.

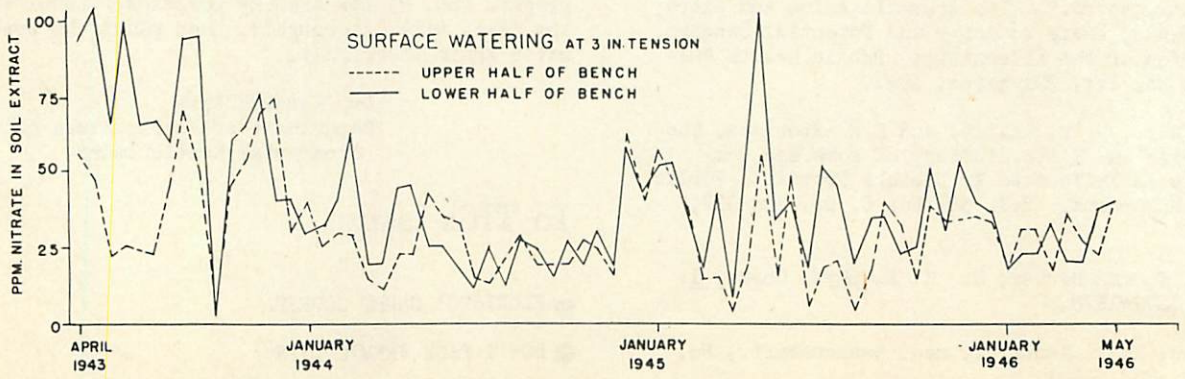

Figure 2. Nitrate parts per million in upper and lower half of soil surface watered.

SUMMARY

1. No significant difference in production or stem length of roses resulted whether automatically watered or surface watered at the same capillary tension.

2. Watering at one inch of tension gave no significant increase in production over watering at three inches of tension although in the first two years there was a tendency toward higher production when watered at the lower tension. Since capillary water moves best in soils with low tension, it is recommended that a tension of less than one inch be maintained.

3. The nitrate level in the upper half of automatically watered soil was higher than in the lower half, but on the average not higher than the surface watered soil, and definitely not above the optimum for good growth of roses.

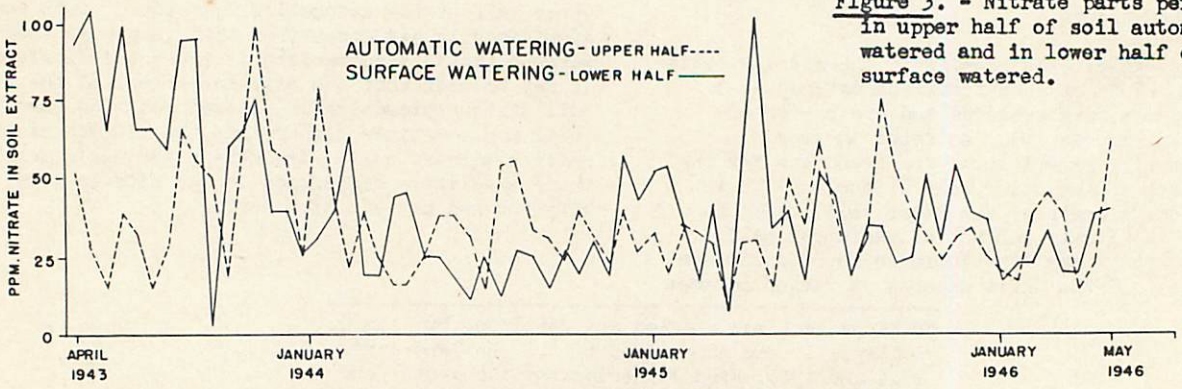

Figure 3. - Nitrate parts per million in upper half of soil automatically watered and in lower half of soil surface watered.