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Controlling Lily Root Rot With Soil pH and Temperature: A Preliminary Report

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The proposed cultural requirements for forcing Easter lilies (*Lilium longiflorum*) are more numerous than the hairs on one's head. Tip burn and scorch of leaves have been a yearly challenge to many growers and almost without exception, every grower has been confronted with root rot problems.

Assorted pieces of literature proclaim the need to maintain a soil with a slightly alkaline pH, low in phosphorus, high in calcium and with an "optimum" level of nitrogen to prevent leaf scorch. It has also been advocated that excessive moisture and non-pasteurized or fungicide treated soils provide ideal environments for organisms involved in the root rot complex.

During the 1973 Easter lily season an experiment was designed to evaluate interactions of soil pH and temperature on the root rot complex. The results were not outstanding, but did indicate some direct relationships. A second experiment was carried out for the 1974 lily crop which provided some definite correlations.

On December 25, 1974 bulbs, size 7/8 of the Ace cultivar, were planted in five inch standard plastic pots using a 1:1:1 mix of Fort Collins clay loam, Canadian peat and washed river sand. The pH of this mix was 7.4. Three pH treatments were established by adding chemicals to develop the desired levels before potting:

Treatment 1 pH 6.5 and/or below
(110 gms $AlSO_4$, 30 gms ground sulfur and 20 gms gypsum per cu.ft. of soil mix)

Treatment 2 pH 6.8 to 7.2
(15 gms $AlSO_4$, 30 gms ground sulfur and 10 gms gypsum per cu.ft. of soil mix)

Treatment 3 pH 7.5 and/or higher
(200 gms calcium carbonate per cu.ft. of soil mix)

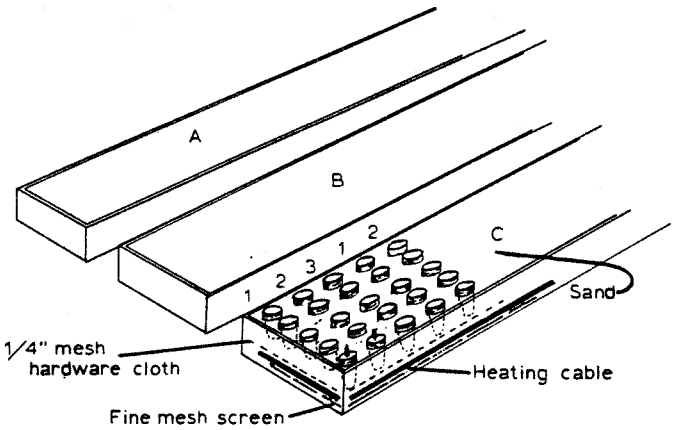

Fig. 1. Design of an experiment developed to evaluate the effects of soil pH and temperature on the root rot complex often associated with the forcing of *Lilium longiflorum*. Pots of soil in benches B and C were controlled at a minimum of 65° and 70° respectively. Bench A was at ambient greenhouse temperature. Treatments 1, 2, and 3 represent the low, medium, and high pH levels.

Soil temperature treatments were established at 3 levels:

Treatment A 60°F
Treatment B 65°F
Treatment C 70°F

Temperatures in the soil of treatments B and C were maintained by placing a thermostatically controlled heating cable on the bottom of the benches and submerging the pots in moist sand above the cable (Fig. 1). Treatment A was allowed to fluctuate with greenhouse air temperature which was maintained at a minimum of 60° to 62°F both day and night, and cooled to 70°F when fan ventilation was needed.

The plants were fed with the same nutrient solution used for carnation and rose production in the research greenhouse range.

Results

The initial application of materials to maintain the pH did not provide the desired levels for all treatments. A 0.1 N solution of sulphuric acid was applied to treatment 1 at weekly intervals to maintain a low pH level. The average pH of the three treatments was 5.9, 7.1 and 7.6 for the low, medium and high levels respectively for all three temperature regimes.

The lower pH level and the warmer soil treatment provided the least amount of visible root rot (Fig. 2). There was little difference in the rot conditions based on soil temperature alone. The greatest contribution to root rot control was attributed to the pH of the growing media.

Other observations included plant height, bud count, days to flower, root development, and leaf loss. There were no detrimental effects on the physiological functions of the plants and no tip burn or leaf scorch occurred. During the applications of the sulphuric acid solutions, some material was splattered on the lily foliage, and small burned spots developed. A final report is forthcoming as the third phase of the experiment is completed during the 1975 lily season.

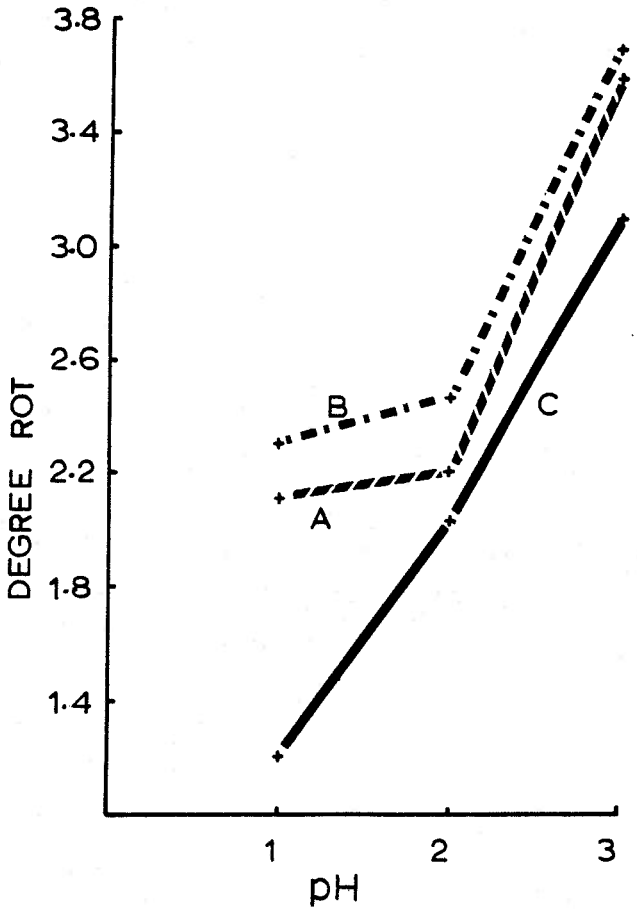

Fig 2. The degree of root rot observed in the root system of Ace cultivars of *Lilium longiflorum* when forced in soils of controlled temperature and pH. The scale used in observing the degree of root rot was: 1.0, no visible rot to 5.0, fully brown and collapsed root system. Temperature treatments were A, 60°F or less; B, 65°F, and C, 70°F. The pH treatments were: 1 6.5; 2, 6.8 to 7.2, and 3, 7.5.