JAPANESE GEORGIA LILY RESPONSE TO ZINC

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Asif (1974) reported that abnormal growth symptoms of 1973 bulbs of Easter lily (*Lilium longiflorum* Thunb. 'Arai #105') could be corrected by applications of zinc, either as an 80 ppm foliar spray or incorporated at 2 ppm in the potting mixture. Experiments were conducted at Sunnyside Nurseries, Inc., Salinas, with 1974 bulbs of 'Arai' to test these methods of treatment for the solution of similar abnormal growth problems under central California conditions.

PROCEDURES USED

Lily bulbs used in the experiments for treatments 1 through 4 (table 1) were potted September 26, 1974, in plastic 6½-inch pots. All bulbs were from the same grower since, in past years, differences in growth have occurred in plants from various Japanese growers. Bulbs for the experiments were imported from Japan under the specification 'Arai,' 7- to 8-centimeter size. Before potting they were dipped for 30 minutes in a mixture of 2.7 ounces Benlate® 50 percent WP, 3.8 ounces Dexon® 35 percent WP, and 2 pounds malathion 25 percent WP per 100 gallons of water.

® Registered trade name.

In treatments 2 and 3, 2 ppm of zinc was incorporated by hand-turning the soil mixture three times just before potting. The zinc material, Geigy Sequestrene® Na_2Zn, contained 14.2 percent zinc as metallic or 17.7 percent zinc as ZnO. A total of 420 bulbs were potted in the soil mixture that contained zinc. A similar soil mixture, but without the 2 ppm zinc, was used for control plants and those that were to receive only foliar zinc sprays. The potted lilies were placed outdoors and grown under standard nursery conditions.

Beginning November 14, 1974, foliar sprays were applied to treatments 3 and 4 as outlined in table 1. Other plants showing possible zinc deficiency symptoms were selected at random from the regular crop, which had not received any zinc treatments up to the date of selection. These plants were divided into two groups for treatments 5 and 6 (table 2).

Spray was applied to completely wet the foliage to the point of runoff. All plants in the experiment were moved to the greenhouse and placed on a bench in December 1974.

TABLE 1. TREATMENTS APPLIED TO 'ARAI' LILY BULBS PLANTED SEPTEMBER 26, 1974, SUNNYSIDE NURSERIES, INC., SALINAS, CALIFORNIA

Treatment*		Treatment means
#1	Check	No treatment with zinc.
#2	Zn soil treatment only	2 ppm Zn incorporated in the soil before potting. No further zinc treatments.
#3	Zn soil treatment plus foliar sprays	2 ppm Zn incorporated in the soil before potting. Three foliar sprays of 80 ppm Zn concentration applied at weekly intervals during the forcing period. (11/14/74, 11/20/74, 11/27/74).
#4	Zn foliar sprays only	Three foliar sprays of 80 ppm Zn concentration applied at weekly intervals during the forcing period (11/14/74, 11/-20/74, 11/27/74).

*210 bulbs per treatment.

TABLE 2. TREATMENTS APPLIED TO PLANTS WITH SUSPECTED ZINC DEFICIENCY SYMPTOMS SELECTED FROM THE GROWING FIELD ON NOVEMBER 14, 1974.

Treatment		Treatment means
#5	Check	No treatment with zinc.
#6	Zn foliar sprays only	Plants sprayed with 80 ppm Zn concentration applied at weekly intervals (11/14/74, 11/20/-74, 11/27/74).

TABLE 3. EFFECT OF THREE 80 PPM ZINC FOLIAR SPRAYS ON PLANT HEIGHT, BUD COUNT, AND REGROWTH OF 'ARAI' LILIES SELECTED FOR ABNORMAL SYMPTOMS ON NOVEMBER 14, 1974, SUNNYSIDE NURSERIES, INC., SALINAS, CALIF.

Treatment	Plant height (inches)	Bud count	Percent normal plants
Control	13.4	5.3	40.0
80 ppm zinc foliar sprays (3 sprays applied at weekly intervals)	10.7	5.2	43.5

TABLE 4. FOLIAR ZINC LEVELS AS AFFECTED BY 80 PPM ZINC SPRAYS WHEN APPLIED TO 'ARAI' LILIES SELECTED FOR ABNORMAL GROWTH SYMPTOMS*

Treatment	Control -no zinc (ppm Zn)	Plants sprayed 80 ppm zinc (ppm Zn)
Control—normal plants potted 9/26/74	34	—
Control—Zinc deficiency or virus-distorted plants; field selected 11/14/74		
a) Plants that recovered during forcing period.	30	39
b) Plants that failed to recover.	36	32

*Sampled at the end of forcing period February 26, 1975

RESULTS

The lilies planted September 26 (treatments 1, 2, 3, and 4) were evaluated on February 25, 1975. All plants appeared normal, and there was no observable difference between the untreated controls and those treated with zinc. Old soil mix from a compost pile made up 5 percent of the soil mix used for the crop and possibly was a source of zinc.

The three zinc foliar sprays did not affect the plants selected from the field with symptoms suspected to be zinc deficiency (table 3). Foliar samples were collected on February 26, 1975. Tissue analyses showed no appreciable differences in zinc levels due to the treatment used (table 4). The plants with abnormal symptoms selected from the field on November 14 contained essentially the same zinc levels as the normal control plants whether or not they had recovered by the end of the forcing period. Consultation with plant pathologists indicates that most of the abnormal symptoms were probably caused by a virus.

CONCLUSION

On the basis of results obtained from application of Asif's (1974) zinc treatments to correct growth abnormalities in Japanese Georgia lilies, it is obvious the procedures were ineffective under central California conditions.

The percentage of plants with abnormal growth symptoms was much less in the 1974 crop than that observed in previous crops. Weather conditions that occurred while the plants were rooted outdoors may have been a prime factor controlling the abnormal growth patterns.

Studies at Sunnyside Nurseries in previous years (unpublished data) have shown that Japanese Georgia lilies with zinc-virus symptoms recovered sufficiently to become salable when subjected to a regular program of non-zinc-containing fungicides applied as soil drenches.

ACKNOWLEDGMENT

The authors wish to express their appreciation to the staff at Sunnyside Nurseries, Inc., Salinas, California for their cooperation with these trials.

LITERATURE CITED

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