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A Preliminary Re-evaluation of Dexon Drenches on Easter Lilies

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During the forcing of the 1969 Easter Lily crop in Denver and surrounding areas, there were some indications that drenching with the chemical fungicide Dexon was causing root damage and, in turn, the yellowing and loss of lower plant leaves.

Dexon was introduced in the early 1960's and one of the earliest evaluations for the control of *Pythium* was by Tammen et al. (8). Recommendations for drench applications have been presented by several researchers (1, 6, 7, 9) and commonly include: 4 oz. (70% W.P.) or 8 oz. (35% W.P.) per 100 gal. of water applied at the rate of 1 pt. per 6-in. pot.

Experiments for the 1970 "lily" season were developed to evaluate the effects of soil moisture and frequency of Dexon drenching on Easter Lily plants.

Methods and Materials

On December 6, 1969, 300 precooled "Ace" lily bulbs, 9 to 10 inches, were planted approximately 1 inch below soil level in 5-inch clay pots in a mixture of 1/3 each peat, sand, and soil by volume. The experiment was composed of 4 treatments (50 pots each) to which one cup of Dexon solution (8 oz., 35% W.P./100 gal.) was applied to each pot at 1, 2, 3, and 4 week intervals. The 4 treatments were further divided into 2 groups based on the soil moisture at the time of drenching. Pots in the wet group were watered normally and the Dexon solution applied when the soil was moist. Pots in the dry group were allowed to "dry out" before the Dexon application. A second part of the experiment involved the application of a Dexon drench

2 times the recommendations on 5 plants from each weekly treatment at the time the first buds were opening.

Forcing temperatures of 55° F night and 60° F day were used until January 10 and then raised to 60° and 70° respectively. Temperatures up to 85° F were used to control the rate of flowering. CO₂ was added during daylight periods of no ventilation, maintaining approximately 500 ppm. The plants were fed each time they were watered with a solution containing the following amounts per 1000 gal. of water: KNO₃, 5 lbs.; Ca (NO₃)₂, 3 lbs.; NH₄NO₃, 1 lb.; MgSO₄, 2.4 lbs.; H₃PO₄, 0.3 lbs.; Borax, 21 gms., and ZnSO₄, 2.8 gms.

All pots were graded when 3 or more buds were bending. Grading was based on the number of dead lower leaves, root loss, and root discoloration due to rot or burn.

Results

Part I. There were no differences in response to the dry or wet conditions in any treatments. There were indications, not statistically analyzed, that weekly Dexon treatments cause increased root damage, leaf loss, and decreased bud count (Table 1).

Part II. Five plants from each treatment in the wet and dry groups were drenched with a double strength Dexon solution (16 oz., 35%/100 gal. or 420 ppm). Within 24 hours, the leaves of plants in the treatment receiving weekly Dexon drenches were drooping and mottled. Leaves in the two week wet treatment were affected with some mottling but not to the extent of the plants in the weekly treatment. Damage in the dry pot group was comparable to the 1 week treatment. No "White" roots were visible in the soil ball in either case. Double doses on the 3 and 4 week treatments created no visual effects.

¹Research conducted as a special problem while a senior at Colorado State University.

Table 1. The response of "Ace" lilies to a Dexon solution (8 oz., 35%/100 gallons water) applied at 1, 2, 3, and 4 week intervals to moist and dry pots.

	Root damage*	Bud count	Leaf loss**
Wet Group			
1 week	.9	5.9	1.9
2 weeks	2.0	6.2	2.2
3 weeks	1.8	6.5	2.1
4 weeks	1.9	6.6	2.3
check	1.5	6.6	1.8
Dry Group			
1 week	1.0	5.4	1.4
2 weeks	1.8	5.9	2.2
3 weeks	1.9	6.5	2.3
4 weeks	2.0	6.4	2.0
check	1.5	6.6	1.8

* Root Damage grade: 0—all roots damaged; 1—much damage; 2—little damage; 3—no damage.

** Leaf loss grade: (based on number of lower leaves lost) 1—more than 25; 2—more than 6, less than 25; 3—less than 6; 4—bottom leaves not affected.

Discussion

Dexon can, when improperly used, burn lily roots and result in leaf loss. Baker (1) reported one-fourth the present day recommendations (50 ppm Dexon) provided good root systems. The manufacturer of Dexon, Chemagro Corporation, recommends 4 to 8 oz./100 gal. of Dexon 35 W.P. be applied initially followed by 4 oz./100 gal. (100 ppm) applications at 2 to 4 week intervals (2). In laboratory assay Khan and Baker (3) showed that the residual activity of Dexon decreased almost linearly from 0 - 28 days after application and 100 ppm was more effective than 50 or 25 ppm.

Based on these experiments and work by Khan and Baker it is therefore possible to accumulate relatively high concentrations of Dexon in the soil and/or plant at presently recommended rates of drenching. An example of the conjecture, utilizing drenches every 14 days, is shown in Table 2.

Table 2. Theoretical accumulation of Dexon in plants drenched with 8 oz., 35%/100 gal. solution.

Days of application after planting	Amount applied per pot	Proportional increase in Dexon
Planting time	1 pint	1.0
14	1 pint	1.5
28	1 pint	1.7
42	1 pint	1.8
56	1 pint	1.9
70	1 pint	1.9
84	1 pint	2.0

It is evident that Dexon leaches readily, but a definite concentration gradient probably occurs in the soil ball. The strength within the gradient may be higher or lower than presented in Table 2.

Kiplinger and Tayama (5) indicated a massive dose, 4 times the recommended rate of Dexon and 2 times that of Terraclor, did not harm "Ace" lilies. Such an application approached the concentration obtained in the 1 week treatment of Part II of the experiment, when the double dose was applied. The final difference in results may have been due to Dexon accumulation, soil moisture content, or the number of new roots which could be instantly harmed.

Conclusions

Many growers of pot plants, including Easter lilies, apply fertilizers, fungicides, and insecticides with a "hose-on" or other siphoning system. Such systems are difficult to regulate and uneven doses of chemicals are usually applied. Much of the root damage to lilies could be attributed to improper application or concentration of Dexon.

The use of plastic pots for growing Easter Lilies is increasing and involves the modification of cultural practices when compared to clay pot culture. Normally plastic pots require less watering; therefore less leaching occurs and Dexon accumulation may be greater.

As previously mentioned, the manufacturer of Dexon recommends an initial drench of 8 oz. (35%)/100 gal. followed by biweekly drenches of 4 oz./100 gal. Perhaps it would behoove growers to heed these recommendations on a trial basis this year and see if lily foliage is improved.

Caution should also be taken to agitate the Dexon solution and make sure the material is used immediately after preparation as decomposition of dilute aqueous solutions occurs within minutes when subjected to sunlight (10). Some growers may have root rot even after application of Dexon. Such a situation could be due to the time interval between mixing, use, and light exposure. If Dexon is stored for short periods, store in total darkness.

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Literature Cited

1. Baker, Ralph. 1961. 1960-1961 Tests for the control of lily root rot. Colo. Flower Growers Bull. 140.
2. Dexon technical bulletin. Jan., 1970. Chemagro Corp. Kansas City, Mo. 64120.
3. Khan, Shamsher and Ralph Baker. 1968. Residual activity of Dexon. *Phytopathology*. 58:1693-1696.
4. Kiplinger, D. C. and H. K. Tayama. 1970. Phytotoxicity of several soil drench materials on "Ace" lilies. *Ohio Florists' Assoc. Bull.* 484.
5. Kiplinger, D. C. 1965. Easter lily culture. *Penn. Flower Growers Bull.* 177.
6. Tammen, James. 1960. Easter lily root rot: review of research. *Penn. Flower Growers Bull.* 118.
7. Tammen, J., D. P. Muse, J. H. Hass. 1961. Soil fungicides and the control of *Pythium* root diseases.
8. Wilkins, H. F. and R. E. Widmer, Dec. 1969. Methods and schedules for forcing Easter lilies - 1970. *Minnesota State Florists' Bull.*
9. Correspondence by the author, October, 1970, with Manager, Product Development, Chemagro Corp., Kansas City, Mo.