HYBRID LILY RESPONSE TO VARIOUS METHODS OF ANCYMIDOL APPLICATION

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Abstract

Commercially produced precooled bulbs of *Lilium* 'Gold Nugget' were treated with ancymidol [a-cyclopropyl-a-(4-methoxyphenyl)-5-pyrimidinemethanol] at 0.25, 0.50 and 1.0 mg active ingredient (a.i.) per bulb as a bulb-dip prior to planting, as a soil drench at planting, and as a soil drench when shoots were 2-3 cm in length. Preplant dips were more effective than drenches in reducing final plant height. Flower number and flower date were not significantly different among rates or methods of application.

Introduction

Hybrid lilies are an increasingly popular floricultural crop both as a cut flower and potted plant (Bowser, 1986). Chemical height control is required for most pot grown hybrid lily cultivars. Ancymidol is the commercially preferred growth retardant for hybrid lilies and is normally applied at 0.25 to 0.50 mg a.i. per pot as a soil drench after shoot emergence (Ball, 1985).

Alternative methods of application have been investigated. Soaking hybrid lily bulbs in ancymidol for several hours has been reported effective (Simmonds and Cumming, 1977). Momentary preplant bulb-dips in ancymidol have given effective height control of Easter lily and are potentially more cost effective (Lewis and Lewis, 1980). When compared on a mg a.i. per bulb basis, they were more effective than either foliar sprays or soil drenches (Lewis and Lewis, 1981).

Many other preplant techniques of applying growth retardants have been investigated with lilies and other plants, but most have limitations which restrict their use in commercial production (Einert, 1976; Wilfret et al., 1978; Lewis, 1982; Reiss-Bubenheim and Lewis, 1984; Gilbertz and Lewis, 1986). Preplant bulb-dips offer a potentially expedient and efficient method of application for hybrid lilies.

This research was designed to investigate the effectiveness of quick bulb-dip application of ancymidol for hybrid lilies compared to conventional drench application.

Materials and methods

Commercially produced *Lilium* 'Gold Nugget' 16/18 cm precooled bulbs were obtained February 1985. A preplant ancymidol dip using solutions of 25, 50 or 100 mg l^{-1} a.i. was applied 28 February by dipping each bulb momentarily for 1 to 2 seconds to completely saturate the space between the outer bulb scales. Based on the average amount of solution required to saturate each bulb, these rates approximate 0.25, 0.50 and 1.0 mg a.i. per bulb. Excess solution was allowed to drain from each bulb prior to potting each singly in 13 cm pots filled with a peat-lite medium.

Two additional groups of bulbs were potted at the same time. Each pot in group one received 0.25, 0.50 or 1.0 mg a.i. ancymidol applied as a 150 ml soil drench at planting. Pots in group two received the same treatments when shoots had emerged 2 to 3 cm.

Plants were arranged in a randomized complete block design with 4 plants per treatment in each of 3 replications, and grown under natural daylength and prevailing light levels in an unshaded glass greenhouse at Experiment, Georgia (33^{o}N latitude). Mean maximum and minimum daily temperatures were 26^{o}C and 16^{o}C. Beginning at flower initiation, all treatments were fertilized weekly with 500 ppm N using a 20N-8.7P-16.6K water soluble fertilizer.

Data collected included days to first flower, number of flowers per plant, plant height from pot rim to base of the first pedicel, and number of nonflowering plants at the termination of the experiment.

Results

Increasing concentrations of ancymidol sequentially reduced height in all methods of applications but with decreasing efficacy at higher rates (table 1). Only the 0.25 mg rate applied as a drench at planting failed to reduce plant height compared to untreated controls. Dip treatments tended to result in shorter plants than those treated at corresponding a.i. rates using either drench method.

Flower number and days to flower were unaffected by rate, method, or time of ancymidol application. Although not measured, flower size also appeared unaffected. The percentage of nonflowering plants, excluding those which failed to emerge, was variable but no clear trends were apparent.

Discussion

Preplant dip applications of ancymidol were effective in reducing final plant height and generally more efficient than either drench method at comparable rates. Similiar findings have been reported for Easter lily (Lewis and Lewis, 1981, 1982) and other crops using preplant application techniques (Lewis, 1982; Reiss-Bubenheim and Lewis, 1984; Gilbertz and Lewis, 1986). Preplant dips at the lowest rate of 25 mg 1^{-1} (equivalent to approximately 0.25 mg/pot) were as effective as 1.0 mg applied as a soil drench. Dip application did not delay flowering, reduce flower number or flower size as has been reported in some preplant application research (Lewis and Lewis, 1980, 1981, 1982; Reiss-Bubenheim and Lewis, 1984, 1985; Gilbertz and Lewis, 1986).

With dip treatments, bulbs are in direct chemical contact. Solution is retained between the bulb scales so that actual exposure or contact time exceeds the 1 to 2 seconds the bulb is immersed, thus extending time for absorption to occur. This contrasts with drench applications in which less a.i. directly contacts the bulb. Absorption from the growing medium occurs over a longer period of time and is largely dependent on root uptake. Delayed drench application until shoots emerge and roots are actively growing may decrease the loss of ancymidol due to leaching, but concurrently delays exposure to the chemical compared to preplant or at planting applications.

While ancymidol is to date the most effective growth retardant for lilies, it is also the most expensive. The more efficient bulb-dip application could reduce chemical cost. Further, the method has appeal in that labor cost of application may also be reduced. Large numbers of bulbs can be treated in a short period of time compared with the more laborious and time-consuming drench method (Lewis and Lewis, 1980; Reiss-Bubenheim and Lewis, 1984). The potential for commercially pretreated precooled bulbs has also been suggested (Lewis and Lewis, 1982) conceivably eliminating the need for growers to apply a growth retardant.

Bulb-dip application of ancymidol appears to have potential in the commercial production of potted hybrid lilies. Additional research is needed to identify rate dependency on cultivar and bulb size.

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Table 1 - Response of *Lilium* 'Gold Nugget' to method, concentration, and time of ancymidol application. (Data reported are means ± standard deviation).

Concentration	Final height (cm)	Days to flowering	Flower number	% Nonflowering plants
Control	26.5±2.5	59.4±0.7	8.8±1.7	20
		preplant bulb-dip		
25 mg l^{-1}	14.2±5.2	59.3±1.1	9.0±0.9	25
50	9.5±3.3	60.2±1.5	7.8±1.5	8
100	6.9±2.2	59.9±1.6	8.3±1.3	17
		drench at planting		
0.25 mg a.i./pot	20.3±3.0	58.9±2.9	8.6±1.9	8
0.50	16.3±4.7	59.3±0.8	9.4±2.0	0
1.00	15.1±3.3	59.5±1.7	8.3±2.3	8
		drench after shoot emergence		
0.25 mg a.i./pot	20.5±3.2	59.3±0.9	8.7±1.1	8
0.50	18.6±4.3	58.5±1.7	9.5±1.6	8
1.00	14.5±4.4	60.0±1.0	8.4±2.2	0