Retention of Ancymidol in a Soil Medium and in Clay Pots

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Abstract. Chrysanthemum morifolium Ramat ‘Fred Shoesmith’ was grown in a soil medium previously used to grow Easter lilies, Lilium longiflorum Thunb. ‘Ace’, treated with single drenches of a-cyclopropyl-a-(p-methoxyphenyl)-5-pyrimidine methanol (ancymidol) in early February and harvested April 26. Enough ancymidol was retained in the medium after 76 days of lily growth and 52 surface-irrigations to significantly retard chrysanthemum growth. Plant height after 10.5 weeks was about 12 and 29% less in clay pots than in untreated medium. However, chrysanthemums grown in a new soil medium in new clay pots were about the same height as plants in new soil medium in pots from the 0.50-mg treatment, indicating that not enough ancymidol to retard chrysanthemum growth was retained in the clay pots.

After several hundred clay pots were used in experiments on growth retardation of ‘Ace’ Easter lilies by ancymidol soil-drench applications, it was questioned whether ancymidol might have been absorbed by the clay pot in quantities sufficient to restrict growth of future crops, and whether ancymidol was retained by the soil medium.

Retention of a growth retardant by a sandy-loam medium was observed by Marth and Mitchell (4). After growing 30 crops of beans over a period of 9 years, enough N, N, N, 2-tetramethyl-5-(methyl-ethyl)-4-[piper-idinylcarbonyl] oxyl[benezanamium chloride (ACPC)] from the original application persisted to inhibit growth of beans, even though ACPC (An-o-1618) is highly water-soluble and theoretically may be lost by leaching.

The differences were detected in pots soaked in ancymidol solutions were dried for 48 hr before planting poinsettias. At the end of the crop (presumably about 3 months later), wheat seedlings, as a bioassay, were sown in new soil in used pots, and retardant residues were detected in pots soaked in ancymidol solutions greater than 50 ppm.

In the lily experiment from which the soil medium and pots were obtained for the following studies, plants had been grown in 1 silt loam: 1 sphagnum peat moss: 1 horticultural perlite (v/v/v) in standard 15-c, clay pots. A single drench of 150 ml of ancymidol solution per pot to provide 0.25 or 0.50 mg per container was applied the first week of February; original plant height averaged 13 cm. Recommended irrigation and fertilization practices for Easter lily were followed (1). There were 52 surface-irrigations in the

Table 1. Residual effect of ancymidol drench treatment of lily soil medium upon the final height of ‘Fred Shoesmith’ chrysanthemum plants 10.5 weeks after planting.

<table>
<thead>
<tr>
<th>Plant height (cm)</th>
<th>(% of control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (control)</td>
<td>68.4 ± 1a</td>
</tr>
<tr>
<td>0.25</td>
<td>60.1 b</td>
</tr>
<tr>
<td>0.50</td>
<td>48.9 c</td>
</tr>
</tbody>
</table>

a Mean separation in column by Tukey’s HSD procedure, 1% level.
rate of plants in soils previously treated with ancymidol was less than in untreated medium (Fig. 1). The significant 12.1 and 28.5% height reduction at termination of the study clearly demonstrates that considerable amounts of ancymidol remained in the soil even after 11 weeks of lily growth and 52 irrigations (Table 1 and Fig. 2).

To study potential retention of ancymidol in the clay pots used for the lily experiments, 'Fred Shoesmith' chrysanthemum plants were grown as previously described, but the plant containers were clay pots from the 0.50-mg ancymidol treatment previously used for lilies. New clay pots were used for comparison. The untreated soil medium previously used for lilies and newly prepared lily soil medium (Table 2) were compared in both treated and new pots.

Plant height in each medium was not significantly different between new pots and the pots from previous ancymidol treatments, indicating that not enough ancymidol had been retained by the pot to influence subsequent chrysanthemum growth. Significant differences in plant height between the new and previously used soil media in both used and new pots probably were due to differences in the initial levels of nutrition.

Table 2. The effect of used and new clay pots and soil media on the height of 'Fred Shoesmith' chrysanthemum plants: July 13, 10.5 weeks after planting.

<table>
<thead>
<tr>
<th>Type of pot And soil medium</th>
<th>Plant height (cm)</th>
<th>(% of control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New pot—new soil medium</td>
<td>74.7 a</td>
<td>---</td>
</tr>
<tr>
<td>Used pot—new soil medium</td>
<td>73.0 a</td>
<td>2.3</td>
</tr>
<tr>
<td>New pot—used soil medium</td>
<td>65.0 b</td>
<td>13.0</td>
</tr>
<tr>
<td>Used pot—used soil medium</td>
<td>66.0 b</td>
<td>11.7</td>
</tr>
</tbody>
</table>

*Used pots and soil medium from lily growth retardant experiment. New pots and new soil medium had not been used for plant growth.

Mean separation in column by Tukey’s HSD procedure, 1% level.

11 weeks between the application of the growth retardant and the end of the experiment, April 26, when soil media and pots from individual treatments were harvested for further research on the retention of ancymidol.

To study potential retention in the lily growing medium, soil medium from individual treatments was transferred to new 13-cm standard plastic pots. The medium from previously untreated plants served as a control. As a bioassay, rooted cuttings of 'Fred Shoesmith' chrysanthemum were planted April 29, 1 plant per pot, and grown single-stem for 5 weeks of long photoperiods followed by short photoperiods until flowering. Plant height (from the rim of the pot to the stem tip) was measured biweekly until July 13. Standard cultural practices were followed (1). There were 6 plants per treatment, with treatments randomized in complete blocks.

Within 2 weeks after planting, the growth

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**Ammonium Toxicity of Impatiens platypetala**

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Additional index words. New Guinea impatiens, bedding plants, nitrogren, nitrapyrin

Abstract. Rooted cuttings of Impatiens platypetala Lindl. were grown in modified Hoagland’s solution at 100 mg N/liter but with varying NH4+/NO3- ratios so that the percentage of N from NH4+ varied from 0 to 60%. Plant fresh weight decreased significantly as the percentage of NH4+ increased. Plants were visually inferior when at least 30% of their N was received as NH4+. When cuttings were grown in a medium of 1 soil: 1 sphagnum peatmoss: 3 perlite, N source had little effect on the fresh weight of the above-ground portion of the plant, but plants receiving NH4+ had more misshapen leaves than those in other treatments. Nitrapyrin (Np), a nitrification inhibitor, did not change response to N sources significantly, but Np tended to lower soil NO3-N concentration.

Most growers of potted plants fertilize weekly with a fertilizer of high N analysis (7). Most of the N in complete fertilizer mixes is NH4+-N, which is rapidly converted to nitrate by nitrification. Barker and Mills (1) report that as much as 40 to 50% of the N is lost by leaching or denitrification in pot culture. The addition of nitrapyrin, a nitrification inhibitor, to ammoniacal fertilizers in soil effectively inhibits nitrification (3). Nitrapyrin also may reduce nitrate loss by reducing denitrification (2, 6). However, maintain N in the ammonium form may be detrimental to crop growth. Most cultivated species are intolerant of high ammonium concentrations inasmuch as the ammonium ion reduces growth and interferes with uptake of other cations, mainly Mg2+ and Ca2+ (5). Terminal epinasty and marginal necrosis occur to a varying degree in many of the inbred lines derived from Impatiens platypetala (PI 349629). Similar symptoms have been found in other plants when the N source in the fertilizer was principally NH4+-N (4). This study tested the response of selected inbreds of I.