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CHEMICAL CONTROL OF SOME URBAN TREE ROOTS WITH PICLORAM UNDER LABORATORY CONDITIONS

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INTRODUCTION

The spreading nature of the roots of some of the commonly grown trees in the urban environment often results in blockage of many sewage and drainage lines, and may cause fracturing of foundation walls. It has been estimated that such losses amount to millions of dollars annually in the U.S. (Leonard & Townley, 1972). The chemical control of such roots with herbicides has previously been reported by Ahrens et al (1970) and Leonard et al (1971). A previous report (Prasad and Moody, 1974) outlined the results of a greenhouse screening study which demonstrated the superiority of picloram (Tordon) for killing and preventing the regrowth of roots of silver maple. The present study was therefore carried out to investigate the efficacy of picloram treatment on the roots of three tree species common to Canadian urban centres, silver maple (Acer saccharinum L.), trembling aspen (Populus tremuloides Michx.), and white elm (Ulmus americana L.).

MATERIALS AND METHODS

(1) Potting Procedure

Young seedlings were potted as described previously (Prasad and Moody, 1974). Each plant (1-2 feet high) was potted in a styrofoam pot (6") and one root was led through an enlarged hole in the bottom and into a plastic pot (4") filled with vermiculite (Fig. 1). The seedlings were held in the greenhouse (22°C, 50% Relative Humidity) until the roots had developed extensively in the lower pots.

(2) Herbicide Treatment

Picloram, (4-amino-3,5,6 - trichloropicolinic acid), was obtained

from the Dow Chemical Company, Canada. Five concentrations (1,5,10,50 and 100 ppm; 100% active ingredients) as well as control (0 ppm) were used for treatment. Seedlings were treated by carefully extracting the root from the lower pot, immersing it in the appropriate concentration for one hour (Fig. 2), and then replacing the treated root in the plastic pot. Three replications of each concentration were used. The seedlings were left in the greenhouse and were inspected daily for root and shoot necrosis. After 21 days, the treated roots were harvested and any new root growth present was weighed separately and expressed as percent regrowth of the average root growth of the controls.

RESULTS

After 2 days, extensive browning of roots was observed for all tree species even at a 5 ppm concentration. Some leaf necrosis was evident at 500 and 100 ppm for elm after one week; however, systemic injury was not evident at the lower concentrations for this species, nor was it evident for any of the concentrations used for the other species. Figure 3 presents the results of the percentage growth of roots after 21 days as a function of concentration. Picloram was effective in killing the roots and preventing regrowth down to a concentration of 5 ppm for the three species tested. These data are consistent with that reported previously which showed picloram to be effective against the roots of silver maple down to 10 ppm*.

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* 10 ppm was the lowest concentration used in the previous experiment.

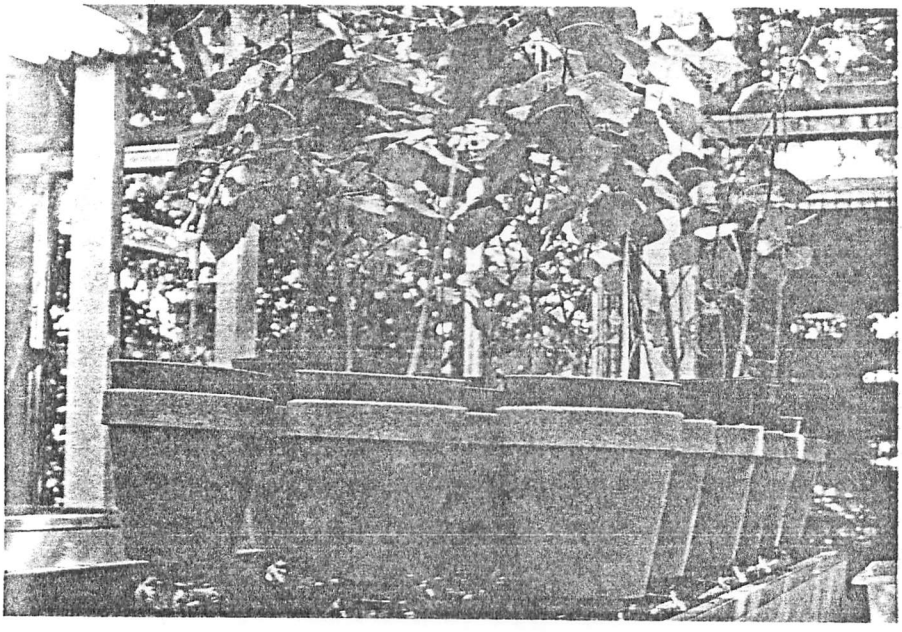

Fig. 1 Method of Potting.

Fig. 2 Method of Treatment with Picloram.

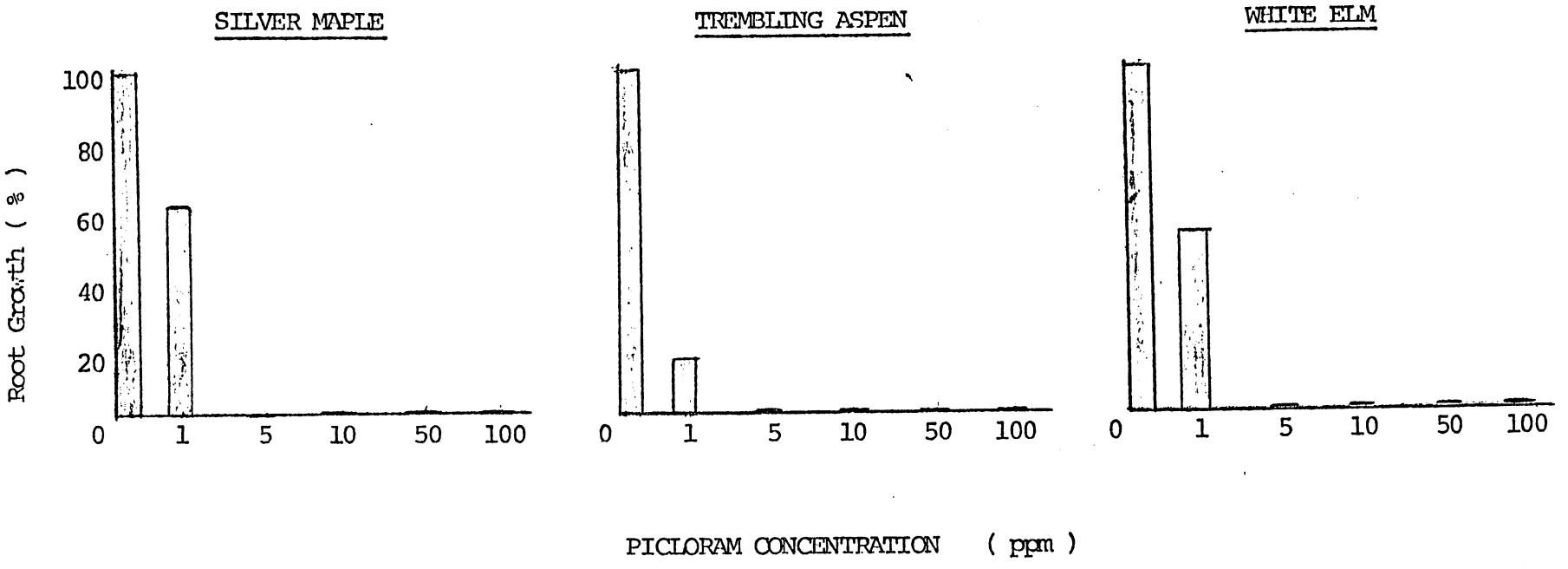

Fig. 3 Effect of Picloram on Root Growth of Maple, Aspen, and Elm Seedlings.

DISCUSSION

Picloram, a wide spectrum herbicide, is presently used in Canada on rights-of-way, including utility lines, pipelines, highways, and railways, for the control of woody and terrestrial broad-leaved plants (Anonymous, 1974). This compound is relatively persistent and residual phytotoxic effects have been observed several years after a single application. For this reason, its use for tree root control should be monitored closely when used in the urban environment. Various soil studies have indicated that leaching of picloram is not substantial. The extent of leaching (about 3%; Trichell et al, 1968) decreased slowly, as the runoff water passed over untreated soil, especially sod. Hence, an application of a dilute solution (5 ppm) for root control would be further diluted during the leaching process, thus reducing the chances of contaminating non-target organisms.

It is recommended that investigations should be carried out under field conditions to determine the practicality of picloram application.

SUMMARY AND CONCLUSIONS

Picloram effectively killed and curtailed regrowth of roots of silver maple, trembling aspen, and white elm at concentrations as low as 5 ppm. Systemic injury was not apparent except at the 100 and 500 ppm treatment of white elm. Small scale field programs should be carried out to determine the effectiveness of picloram for the following applications.

(a) Treatment of sewers and drains clogged with tree roots.

(b) Treatment of roots potentially harmful to foundation walls, pavements, etc.

It is also suggested that picloram should be tested against elm roots in order to curtail the transmission of Dutch elm disease by root grafting.

ACKNOWLEDGEMENTS

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