A SIMPLE POT TECHNIQUE FOR DETERMINING PHYTOTOXICITY OF A SOIL-INCORPORATED PRE-EMERGENCE HERBICIDE

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INTRODUCTION

There is a need for a simple technique for the preliminary determination of the gross effects of soil-incorporated pre-emergence herbicides. The technique described below was used to determine the tolerance of maize to a herbicide, in this case, CP44939, applied as a soil-incorporated pre-emergence treatment at five dosage rates and five intervals prior to planting.

MATERIALS AND METHOD

The pots used in the experiment were plastic buckets with a 2 gal. (9.09 litre) capacity and a 9 in. (22.86 cm) opening. They were filled with 22 lb (9.98 kg) of air dried soil from the 0-4 in. (0-10.16 cm) horizon, which had been passed through a 0.25 in. (6.35 mm) sieve. Chemical and mechanical analyses of the soil were carried out. A polythene sheet was used to separate the top 2 in. (5.08 cm) of soil from the soil in the remainder of the pot.

Herbicide was applied at rates of 0, 2, 4, 8 and 10 lb a.i. per acre (0,2.24, 4.48, 8.96, and 11.20 kg per hectare) at 8, 4, 2, 1, and 0 weeks prior to planting maize. The experiment, which was laid out as a 5 x 5 factorial lattice square design of 4 replications, was located in a glasshouse. The herbicide was applied with an Oxford Precision Sprayer at 20 gal. per acre (224.60 litres per hectare) and 30 lb per sq. in. (2.10 kg per sq. cm).

For spraying, the pots were laid out on the ground within a known area and the calibrated boom passed over the top of the pots. Incorporation, which took place immediately following spraying, was achieved by lifting off the top 2 in. (5.08 cm) of soil by means of the polythene sheet, placing the treated soil in a polythene bag, and shaking vigorously for 60 seconds. The soil (with the incorporated herbicide) was replaced in the pots, which were then positioned in a glasshouse. From the time of spraying until planting, moisture in the top 2 in. of soil in the pots was brought up to around field capacity at intervals of 5 days.

Hybrid maize variety Q 692 (98.8% germination capacity) was planted at the rate of 10 seeds per pot at a depth of 1.50 in. (3.81 cm). From the time of planting until the conclusion of the experiment the whole volume of soil in the pots was brought up to around field capacity at intervals of 5 days.

DATA COLLECTED

Each day, during the 21 days from planting to harvesting, a record was made of newly emerged plants and the actual numbers of surviving plants. Observations were made on the appearance of the maize plants during the course of the experiment. Final assessment of the trial was made by washing all plants free of soil and measuring the length of the above- and below-ground parts of each plants; the parts were then separated, and the plants making up each part were bulked and oven dry weights determined. These measurements served as parameters of the plant's response to the herbicide.

DISCUSSION

Results from the trial indicated that the technique used was adequate to determine differences at the herbicide levels used. The technique is not demanding in terms of materials. Nearly all items would be readily available to any person involved in experimenting with applied weed control. The procedures used are quite simple and not time-consuming. If more detailed information were required, the basic procedure would need very little modification. Additional time and ancillary equipment would no doubt be required to investigate in greater depth the mechanisms of phytotoxicity of a soil-incorporated herbicide.