Research Notes

MOBILITY AND PERSISTENCE OF ATRAZINE AND METRIBUZIN IN FOUR SOILS FROM PUERTO RICO[1, 2]

Greenhouse experiments were conducted during 1972–73 to determine the initial inactivation, the mobility when soils were irrigated, and the persistence of the two herbicides 2-chloro-4-(ethylamino)-6-(isopropylamino)-*s*-triazine (Atrazine) and 4-amino-6-*terc*-butyl-3-(methylthio)-*as*-triazin-5(4H)one (Metribuzin). The amounts of the herbicides present in soils (table 1) after treatments were determined by bioassays using oats (*Avena sativa* L. 'Markton') as the test species, and comparing the green weights with growth curves obtained from seeding oats in sand treated with six known rates of herbicides. The sand used contained 81 percent silicates, mainly quartz, and 18.4 percent calcareous materials. Herbicide inactivation in sand (washed several times with tap water to eliminate colloidal particles) was assumed to be insignificant.

TABLE 1.—*Chemical and physical properties of four Puerto Rican soils*

Characteristics and soil contents	Soil series			
	Toa	Coto	San Antón	Fraternidad
Sand (%)	39.6	46.4	41.4	33.4
Silt (%)	30.5	18.0	31.0	26.0
Clay (%)	29.9	35.6	27.6	40.6
Organic matter (%)	3.0	3.6	3.1	2.7
pH	6.8	7.4	6.9	6.6
CEC	27.6	13.6	28.6	42.2
P (p/m)	6.0	4.0	18.0	2.0
K (meq/100 g)	2.2	1.6	2.6	1.3
Ca (meq/100 g)	12.0	10.5	18.7	20.8
Mg (meq/100 g)	10.2	0.7	5.3	11.3

Atrazine was less phytotoxic than Metribuzin in sand and in the four soils studied. The initial inactivation of Atrazine, due mainly to adsorption, was equal in all soils and was not correlated significantly with any particular soil characteristic. The initial inactivation of Metribuzin was greater in Fraternidad and Coto clay soils than in San Antón and Toa clay loams.

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[2] From a thesis by P. L. Chavarría in partial fulfillment of the requirements for the M.S. degree at the University of Puerto Rico, Mayagüez Campus, Mayagüez, P.R.

This inactivation was positively correlated with the clay content (r = 0.9739) and negatively correlated with the exchangeable potassium content (r = −0.9203) of the soils studied.

In 30 cm soil columns, Atrazine did not move below the 0–10 cm section when 10 cm of water was applied. With 20 cm of water Atrazine moved down to the 10–20 cm section in the Coto, Toa, and Fraternidad soils, although in a greater amount in the Coto soil. Metribuzin, with 10 cm of water, stayed in the 0–10 cm soil section, except for the Fraternidad soil where it also reached the 20–30 cm section. With 20 cm of water Metribuzin stayed in the 0–10 cm section of the Toa soil, but moved mostly to the 10–20 cm section in the San Antón soil. In the Fraternidad soil some Metribuzin penetrated to the 20–30 cm section but most of the herbicide stayed at the 0–10 cm; in the Coto soil it moved downward about equally in all three soil sections.

Atrazine was more persistent than Metribuzin in the soils except in the Fraternidad. After 45 days of the application of 2 p/m (w/w), 7.5 percent of the applied Atrazine remained in all soils studied. Metribuzin degradation was significantly different in the different soils. After 45 days of the application of 2 p/m (w/w), 0.5, 2.5, 4.0, and 5.0 percent of the applied Metribuzin remained in the Coto, Toa, San Antón, and Fraternidad soils, respectively.

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