Movement of 2,4-D in Soil

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In a previous report an experiment was described in which the movement of sodium trichloroacetate (TCA) in soil following different amounts of rainfall was studied. The results of a similar experiment with 2,4-D are presented in this report. The technique and procedure used was essentially the same as that used in the TCA experiment with the exception that in the present study two different conditions of soil moisture were used, one in which the soil was relatively dry and one in which the soil had been saturated before the experiment was started.

A level area of Toa silty clay loam was cleared of weeds and divided into two blocks of 25 plots each. The individual plots were 3 by 3 feet. Before the experiment was started, but after the weeds were removed, one block was watered until saturated and the other block remained dry. The soil moisture in the wet block ranged from 17% at the surface to 27% at a depth of 12 inches with an average moisture content of about 23%. The soil moisture in the dry plots ranged from 5 to 23% with an average of about 17%.

Five treatments replicated five times and as square design were initiated as follows in each plot: five check plots were covered with paper, and the remaining plots were sprayed with an aqueous solution of 82% sodium 2,4-D at 5 pounds per acre acid-equivalent applied with a knapsack sprayer. Within 3 hours after the 2,4-D was applied, groups of five plots in each block were each watered with the equivalent of 0, 1/4, 1/2, and 1 inch of rainfall. The water was sprayed into metal enclosures 18 by 18 by 6 inches deep into the center of each plot of the water applied eventually moved downward. The following day 6- by 6-inch layers of soil at 1/4-inch intervals for the first inch and then at 1-inch intervals for 11 inches were taken from each plot. These soil samples were obtained by digging a V-shaped hole 14 inches deep across the center of the plots and then removing the layers of soil with a broad bladed knife and a spatula. The soil was broken into fragments suitable for planting pea seed in cans in the greenhouse. Ten pea seed were planted in each can and enough water applied for germination. Germination counts were made weekly. Four weeks after planting, the fresh weight of tops of plants was obtained, and this was used as a criterion of the presence of 2,4-D in the soil.

The data obtained showed that sodium 2,4-D did not move beyond the first inch, and very little moved beyond the first half inch of soil regardless of the amount of rainfall applied or whether the soil was saturated or relatively dry.