CONSIDERATION OF SOIL ORGANIC MATTER IN MAKING HERBICIDE RECOMMENDATIONS

G. F. WARREN
Purdue University, Lafayette, Indiana, U.S.A.

The characteristics of a soil can influence the choice of herbicide, optimum dose to control weeds without crop injury, and residual life in the soil. Of all the soil properties that have been studied, soil organic matter content generally has been shown to be the single most important property influencing the behaviour of soil-applied herbicides.

If a herbicide is strongly adsorbed by organic matter, the dose required to control weeds increases linearly as organic matter increases up to about 15%. Above 15%, the increase per unit of organic matter is less than would be predicted. Atrazine, chlorophroham, chlorothal, linuron and trifluralin are examples of herbicides where the dose required increases with organic matter.

When herbicides that are weakly adsorbed are applied to soils of very low organic content, they may be lost so rapidly by leaching that weed control is poor. In this situation, crop selectivity based on “depth protection” is not possible. Examples of such herbicides are chloramben, 2,4-D, alidochlor, and propachlor. In soils with more organic matter, these herbicides perform well since they are less readily leached than in the low organic soils and the dose required for weed control increases only slightly with large increases in organic matter.

The residual life of a herbicide also is influenced by organic matter. Herbicides that are resistant to decomposition, yet are not strongly adsorbed, will have a shorter residual life, in humid regions, on soils of low rather than high organic matter content. This was observed several years ago for 2,4,5-TBA and more recently for diphenamid and is due to differences in rate of leaching. For herbicides that are strongly adsorbed, the residual life will be shorter in soils that are high in organic matter. This is due to a reduction in the effective concentration of the herbicide applied by adsorption on organic colloids. Thus, the choice of herbicide as well as the optimum dose is dependent on soil organic matter content.