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PERSISTENCE OF HERBICIDES IN SOILS

Philip C. Kearney
Plant Science Research Division,
Agricultural Research Service,
U.S. Department of Agriculture
Beltsville, Maryland 20705

S U M M A R Y

The United States currently markets about 127 different herbicides for various weed control purposes. These herbicides are used on approximately 122 million acres (49,500,000 hectares). They may persist in soils for several hours, days, or months depending on the chemical and physical characteristics of the herbicide, and the climatic and soil conditions at the site of application. Processes affecting herbicide persistence in soils include photodecomposition, leaching, volatility, adsorption, microbial metabolism, plant uptake, and chemical transformation. The rate of disappearance of a herbicide by one of these processes depends on such factors as rate of application, soil type, depth of application, soil temperature, soil moisture, pesticide combinations, pH, microbial ecology, aeration, vegetation, formulation, and the interaction of these factors.

For maximum effectiveness, a herbicide should persist for most of the growing season and then degrade to nonphyto-toxic compounds. Residual herbicides create problems when they persist for longer than one growing season, particularly in crop rotations. Plant bioassay techniques suggest that certain classes of herbicides can be grouped on the basis of persistence. The carbamates (EPTC, CIPC) aliphatic acids (TCA, dalapon) and phenoxy herbicides (2,4-D, MCPA) are generally degraded 3-5 months after application. Certain benzoic acid (2,3,6-TBA, fenac), phenylurea (diuron) and s-triazine herbicides (simazine) may persist longer than one growing season. The persistence of many individual herbicides and factors affecting their persistence will be discussed.