

VPLIV TALNIH DEJAVNIKOV NA USODO HERBICIDA IZOPROTURONAMarjetka SUHADOLC¹, Reiner SCHROLL²¹Biotehniška fakulteta, Oddelek za agronomijo²GSF - National Research Center for Environment and Health, Institute of Soil Ecology**IZVLEČEK**

Usoda herbicidov v tleh je odvisna od talnih dejavnikov, lastnosti pripravka ter dejavnikov okolja: rastne dobe in podnebnih razmer ter njihovih sezonskih gibanj. Izoproturon [N-(4-izopropilfenil)-N',N'-dimetilurea], izbrani modelni herbicid v naši študiji, spada v skupino fenil-sečninskih herbicidov in se široko uporablja za zatiranje travnega in širokolistnega plevela v ozimni pšenici, ječmenu in rži. Izoproturon je količinsko med najbolj uporabljanimi pesticidi konvencionalnega kmetijstva Zahodne Evrope. Posledično ga zasledimo kot enega izmed onesnažil podtalnice in površinskih voda. Njegova usoda v okolju, posebno razgraditev, je zato predmet številnih študij. V prispevku bomo na osnovi literaturnega pregleda in izsledkov lastnih raziskav ovrednotili možne usode izoproturona v odvisnosti od talnih lastnosti. Usodo izoproturona smo preučevali v kontroliranih razmerah laboratorijskih razgradnih testov in mikrokozem talnih kolon ter v zunanjih lizimetrovskih poizkusih, v vseh primerih s ¹⁴C tehniko. Ugotovili smo, da je razpon mineralizacije izoproturona 2-3 mesece po uporabi lahko od 5% do 60 % uporabljene količine herbicida v odvisnosti od talnih dejavnikov (sposobnosti mikrobnih združb za razgraditev, vsebnosti vode v tleh, pH, vsebnosti organske snovi in glin, vsebnosti biotično dostopnih težkih kovin). Na osnovi analiziranih razgradnih produktov sklepamo, da je glavna pot razgradnje izoproturona demetilacija, ki vodi do metabolitov MDIPU [3-(4-izopropilfenil)-1,1-metilsečnine] in DDIPU [3-(4-izopropilfenil)-sečnine], ter kasneje do anilina. Pomemben proces v usodi izoproturona je nastanek vezanih ostankov (*bound residues*), saj smo v talnih vzorcih analizirali tudi več kot 50% uporabljene količine izoproturona v tej obliki. Izhlapljanje in izpiranje izoproturona je bilo v naših poizkusih v preučevanem obdobju 2-3 mesecev po uporabi minimalno.

Ključne besede: tla, izoproturon, razgradnja

ABSTRACT**EFFECTS OF SOIL PARAMETERS ON THE FATE OF THE HERBICIDE ISOPROTURON**

The fate and behaviour of herbicides in soil is governed by many different factors including soil characteristics, compound properties and environmental factors: vegetation, climate conditions and any seasonal fluctuations. Isoproturon [3-(4-isopropylphenyl)-1,1'-dimethylurea], the chosen model compound in our study, is an herbicide belonging to the class of phenyl-urea derivatives, widely used in agriculture for the pre- and post-emergence control of annual grasses and broad-leaved weeds in cereals. It is among the most used herbicide in conventional agriculture in Western Europe, resulting in contamination of ground and surface waters. Its fate in the environment, specifically degradation, has been intensively studied. In the article, effects of soil parameters on the fate and behaviour of isoproturon will be evaluated considering literature overview and results of own research work. The fate of isoproturon was examined in laboratory degradation tests and in microcosm soil columns, as well as in outdoor lysimeter experiments, in all cases using ¹⁴C technique. The results of our study have shown that the total mineralisation over a period of 2-3 months can range from 5% to 60% regarding to the soil parameters (microbial community capability to degrade isoproturon, soil water content, pH, organic matter and clay content, bioavailable heavy metal content). The degradation products analyses of soil samples indicated that the main metabolic pathway involves an initial N-demethylation of isoproturon to MDIPU [3-(4-isopropylphenyl)-1,1-metilurea], followed by another N-demethylation to DDIPU [3-(4-izopropilphenil)-urea] and cleavage of the urea side chain to anilin. Formation of bound residues is an important process in the fate of isoproturon as more than 50% of applied amount can be found in this form. Volatilisation and leaching of isoproturon over a period of 2-3 months have been in our experiments negligible.

Key words: soil, isoproturon, degradation, environmental fate

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