

**OPREDELITEV FIZIKALNO KEMIJSKIH LASTNOSTI TAL IN FFS ZA OCENO
TVEGANJA ONESNAŽEVANJA PODTALNICE**Andrej SIMONČIČ¹, Marko ZUPAN², Matej KNAPIČ³, Borut VRŠČAJ⁴, Metka
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V raziskavi smo izdelali kriterije in podlage za strokovno rabo fitofarmaceutskih sredstev (FFS) na izbranih območjih v Sloveniji. Kriterije in podlage smo opredelili za herbicide, ki pomenijo največje tveganje za okolje in za talne tipe treh izbranih območij v Sloveniji. Herbicide smo na podlagi različnih kemijskih lastnosti razvrstili v štiri skupine. Odločujoče lastnosti za razvrščanje posamezne aktivne snovi so razpolovni čas razgradnje (DT_{50}), moč vezanja na organsko snov v tleh (Koc), topnost v vodi in nekateri drugi dejavniki kot je obseg rabe pesticidov. V prvo skupino smo uvrstili herbicide, pri katerih je tveganje za onesnaževanje podtalnice in pitne vode minimalno. V drugo in tretjo skupino so uvrščeni pripravki, pri katerih so zelo pomembne lastnosti tal in je njihova uporaba v veliki meri odvisna od le-teh. V zadnji, četrti skupini pa so herbicidi, katerih fizikalno kemijske lastnosti so neugodne in jih na vodovarstvenih območjih ne glede na lastnosti tal ne priporočamo. Razvrstitev v Sloveniji registriranih herbicidov leta 2002 je pokazala, da je večina od 121 herbicidov razvrščena v skupini tveganja 2 in 3 (71 %). Med registriranimi pripravki je bilo 21 % takšnih, katerih uporabo bi na najbolj občutljivejših območjih odsvetovali. Vendar ima dovoljenje za uporabo le še 8 % oziroma 10 pripravkov med katerimi sta aktivni snovi simazin s tremi pripravki in prometrin s štirimi pripravki. Kriterije talnih lastnosti pomembnih za vezavo oziroma izpiranje FFS iz tal smo opredelili s točkami izračunanimi iz atributnih podatkov digitalne pedološke karte. Pri razvoju algoritma smo uporabili delež organske snovi v tleh (v prvem in drugem zgornjem horizontu tal) in podatek o povprečni globini tal. Podatke o teksturi tal smo uporabili pri testiranju algoritma z modelom PELMO, ki je eden od uradnih modelov EU pri registraciji FFS. Pedosistematske enote smo glede na izračunane točke razvrstili v pet kategorij glede na tveganje izpiranja FFS iz tal. Rezultati razvrščanja na izbranih območjih Ljubljane, Celja in Murske Sobote so pokazali, da največji delež (37,3 %) predstavljajo talne enote, kjer je tveganje izpiranja FFS srednje veliko, z 29,6 % sledijo talne enote z zelo velikim tveganjem za izpiranje, talnih enot z velikim tveganjem za izpiranje FFS je 22,9 %, talnih enot kjer je tveganje za izpiranje FFS majhno oziroma zanemarljivo pa je le 7,6 % oziroma 2,5 %. Za omenjena tri območja smo izrisali tematske karte zemljišč kmetijske rabe.

Ključne besede: tla, pripravki za varstvo rastlin, fizikalno kemične lastnosti, podtalnica, onesnaževanje, varstvo pred onesnaževanjem

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ABSTRACT

DETERMINATION OF PHYSICAL AND CHEMICAL PROPERTIES OF SOILS AND PESTICIDES FOR THE ESTIMATION OF GROUNDWATER POLLUTION RISK

In the current research the criteria and bases for a professional use of pesticides in the selected areas of Slovenia were made. The criteria and bases were defined for herbicides which represent the highest risk for environment and soil types of three selected areas of Slovenia. Herbicides were classified into four groups based on different chemical properties. The crucial properties utilised for the classification of individual active substances are the following: half life of degradation (DT_{50}), the ability of binding to organic matter in soil (Koc), solubility in water and some other factors such as the extent of pesticide use. The first group includes herbicides with the minimum groundwater and drinking water pollution risk. The second and the third group contain products for which the properties of soil are very important and their use depends very much on these properties. In the last, the fourth group there are herbicides whose physical-chemical properties are unfavourable and they are not recommended for the use in water protection areas irrespective of soil properties. The classification of herbicides registered in Slovenia in 2002 has shown that most of 121 herbicides are classified in the risk groups 2 and 3 (71 %). Among the products registered there were only 21 % of those which use in the most susceptible areas would be warned against. However, the official registration for use at the time have only 8 % of them or 10 products among which are the active substances simazine with three products and prometryne with four products. Soil organic matter content of the first two soil horizons and soil depth were attribute data from digital soil map of Slovenia that was used to calculate the risk of pesticide leaching through the soil profile. Soil texture data was used during the validation of algorithm with PELMO model, which is one of the official models used during the registration process of pesticides in EU. According to the risk of pesticide leaching through the soil profile soil mapping units (SSU) were classified into 5 categories. The majority of SSU (37.3 %) from selected test areas of Ljubljana, Celje and Murska Sobota were classified into the group with possible risk, the next most frequent group was the very high risk group with 29.6 % of SSU; the group with the high risk of pesticide leaching through soil profile was the next group with 22.9 % of SSU; in the last two groups with minor and negligible risk of pesticide leaching there were only 7.6 % and 2.5 % of SSU from tested areas. Thematic maps with five risk categories of soils with agricultural land use on tested areas were printed out.

Key words: soil, pesticides, physical and chemical properties, groundwater pollution risk, pollution prevention