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## **The effect of microbiological preparations on the degradation of herbicides and polycyclic aromatic hydrocarbons**

The presence of polycyclic aromatic hydrocarbons (PAHs) and residues of plant protection products in the environment is closely associated with man's activities. These contaminations pose a serious threat to safety and health of humans and animals, due to their toxic properties and persistence. Biodegradation is a natural process for removing contaminations from the environment, during which toxic compounds are transformed into their less harmful forms.

The primary aim of the study was to evaluate the influence of commercially available microbiological formulations used in the agriculture on herbicides and PAHs degradation in the soil. Additionally, the influence of those formulations on physical and chemical parameters (the pH and the oxidoreduction potential) of the soil, as well as dehydrogenase activity were analysed.

On the basis of the literature review focusing on microbiological formulations recommended in the Integrated Plant Protection it was found that bacteria belonging to *Bacillus* spp. and *Pseudomonas* spp., *Trichoderma* spp. fungi, and *Saccharomyces cerevisiae* yeasts were the most important and the most promising, due to their effectiveness in pesticide degradation and a large number of commercial formulations containing those microorganisms available in the market.

The study analysed commercially available microbiological formulations containing bacteria and/or yeasts and used for revitalisation and for improving composition, condition and microbiological activity of the soil. Some of them also support natural immunity of the plants and protect them against diseases. The conducted studies show that bacterial and yeast formulations influence degradation of studied PAHs and herbicides: clomazone, fluzifop-P-butyl, flurochloridone, metribuzin, pendimethalin, and propyzamide, except for diflufenican. The formulations containing yeasts positively influence the soil remediation, as well as seed germination and plant growth in the cultivated pea.

The results of this study clearly confirm that microbiological formulations can be either a supplement or an alternative to chemical agents used in the agriculture. Their use should be recommended due to improved quality and safety of the environment.