



The effect of copper and zinc content in the soil on the degradation of selected herbicide active substances

The aim of the research was determination of the effect of copper and zinc on the course and pace of the degradation of herbicide active substances in the soil, as well as the assessment of this effect according to the source of contamination. The experiments were conducted in controlled conditions. Soil samples for the tests were collected from farmlands, namely from the depth of arable layer 0–20 cm. The research involved two types of the soil of different chemical and physical properties. Each variant of the study made use of two types of the soil featuring diversified Cu and Zn content. The first group of soils (GS1; GS2), of elevated content values of the two elements, originated from the farm land situated in the vicinity of Legnica Copper Foundry. The second group of soils (GN1; GN2), characterizing low content of Cu and Zn, was collected from the farmland in the region of Wrocław. In order to reduce the effect of soil properties on herbicide decomposition the soils subjected to one variant of the research did not differ in their chemical and physical properties. Moreover, GN soils were purposefully contaminated with Cu and Zn salts, in laboratory conditions, to reach the content of the pollutants equivalent to that in the soils coming from the area near Legnica Copper Foundry. Herbicides containing metazachlor, chlorotoluron and bromoxynil were applied on the soils prepared as mentioned above. The soil samples for herbicide residues determination were collected in assumed equal intervals. The not degraded herbicide residues were determined by chromatography technique HPLC/UV and GC/EC. In the examined soils microbiological activity was also determined. The amount of dehydrogenases present in the soil material was assumed as an indicator of this parameter. The herbicides subjected to research feature medium durability in the soil. Their half-life, in the conditions of the experiments, ranges from 8 to 44 days. The presence of copper and zinc in the soil modifies degradation of the examined substances. The course and pace of this process is dependent on the type of herbicide active substances, the type of soil, as well as the source of contamination with metals. Moreover, the application of herbicides caused short-term, i.e. about 7-day lasting decrease in microbiological activity of the soil. After that period the mentioned activity was increasing to eventually reach approximately the previous level.