



THE EFFECT OF MDA6 HERBICIDE ON SOIL MICROBIOTA

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Abstract: The application of herbicides in agricultural crops can have an adverse influence with qualitative and quantitative changes on the microbial populations of the soil, by changing the enzymatic activities at the soil level, a fact due to the herbicide concentrations applied, the physico-chemical and behavioral characteristics of the herbicide at the level of different types of ground. Enzyme activities are considered indicators of soil quality assessment in case of possible contamination, enzyme activities are early indicators that indicate soil degradation when herbicides are not applied. The enzymatic activities of the soil most frequently determined in studies to assess the possible contamination with herbicides are hydrolases. In the present study, the effect of the MDA6 herbicide was monitored for 28 days, whose active substance is 2.4% D acid from dimethyl amine salt, with a concentration of 660 g/l, frequently applied in straw crops (wheat crops). During the experimental period, 4 enzyme activities: catalase, dehydrogenase, urease, and phosphatase, were determined at 7-day intervals. In the same way, the quantitative analysis of the micropopulation of bacteria and fungi from the soil samples treated with four concentrations of MDA6 herbicide was carried out. The results obtained in the experimental study showed an inhibitory effect of the herbicide MDA6 on the investigated enzymes, those activities showing a tendency to return after 28 days. Microbial communities of bacteria and fungi registered imbalances depending on the tested herbicide concentration, the effects of returning to normal values being identified after 28 days after administration.

• Introduction

- ✓ 2,4 D dimethyl amine salt is a herbicide that helps control dicotyledonous weeds in wheat and corn crops.
- ✓ There are some studies that demonstrate that the herbicide, in addition to the target organisms (dicotyledonous weeds), also affects the microbial communities in the soil.

• Material and method

- ✓ The enzymatic activities chosen for assay were: dehydrogenase (EC 1.1.1.1), urease (EC 3.5.1.5), phosphatase (EC 3.1.3.2) and catalase (EC 1.11.1.6). The activities of dehydrogenase, urease and phosphatase were determined by using a T90 UV/Vis spectrophotometer and the titration method was used to determine the catalase activity.
- ✓ Evaluation of the total number of bacteria CFU (colony forming units)/g of soil was done using the Plate-Count-Agars (PCA) culture medium, and the dilution of 10⁻⁶ from the soil treated with herbicide.
- ✓ Evaluation of the total number of fungi CFU/g soil was done using the Potato-Glucose-Agar (PGA) culture medium, and the dilution of 10⁻³ from the soil treated with herbicide.

Conclusions

- ✓ Microbiological parameters investigated: the microbial enzyme activity, the micropopulation of bacteria and fungi, at the level of the soil treated with MDA6 registers variations depending on the concentration of herbicide applied and the length of time from the moment of application. It is worth noting the ability of the soil to restore its equilibrium towards the end of the experiment period.

• Results and discussions

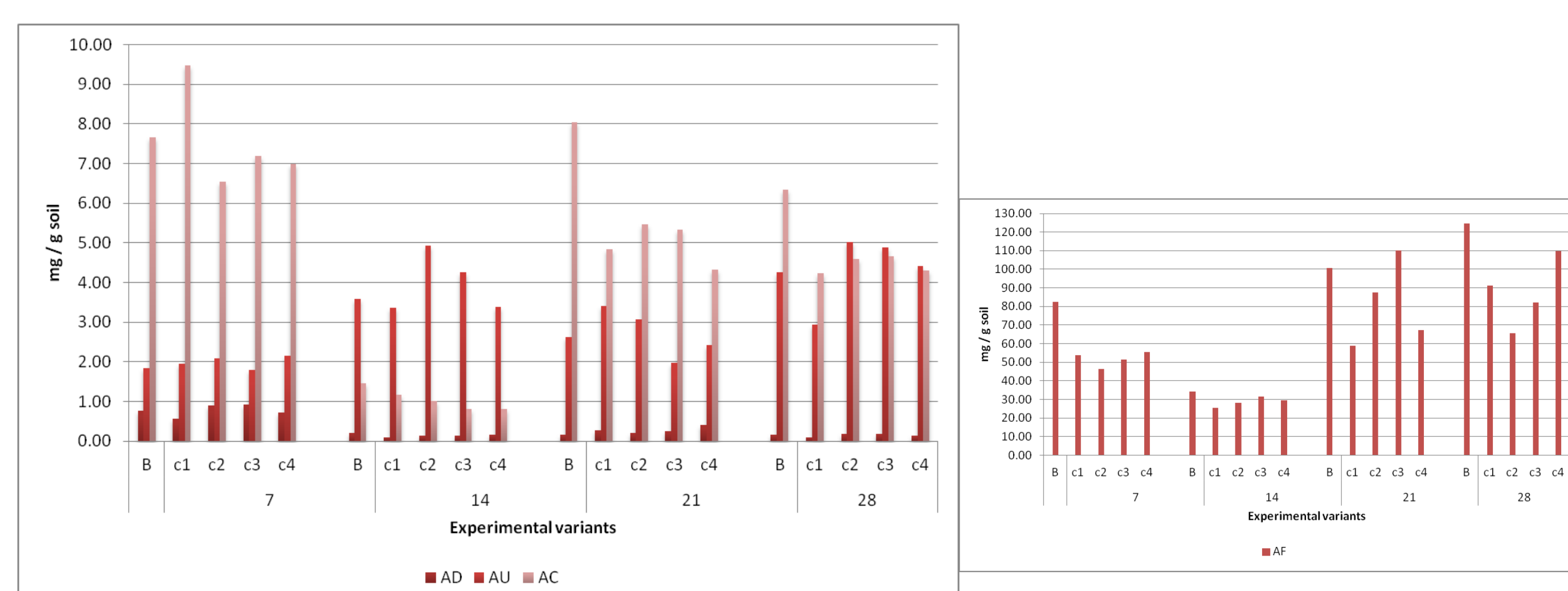


Figure 1. Enzyme activity values determined at the level of soils treated with DMA6 (A. DA-dehydrogenase activity, UA-urease activity, CA-catalase activity, B. AF-phosphatase activity, all enzyme activities are expressed in mg/g soil) (B-untreated soil, c1-minimum normal dose-DNmin, c2-maximum normal dose-DNmax., c3- 1/2 maximum normal dose- 1/2DNmax., c4 – 2*DNmax.)

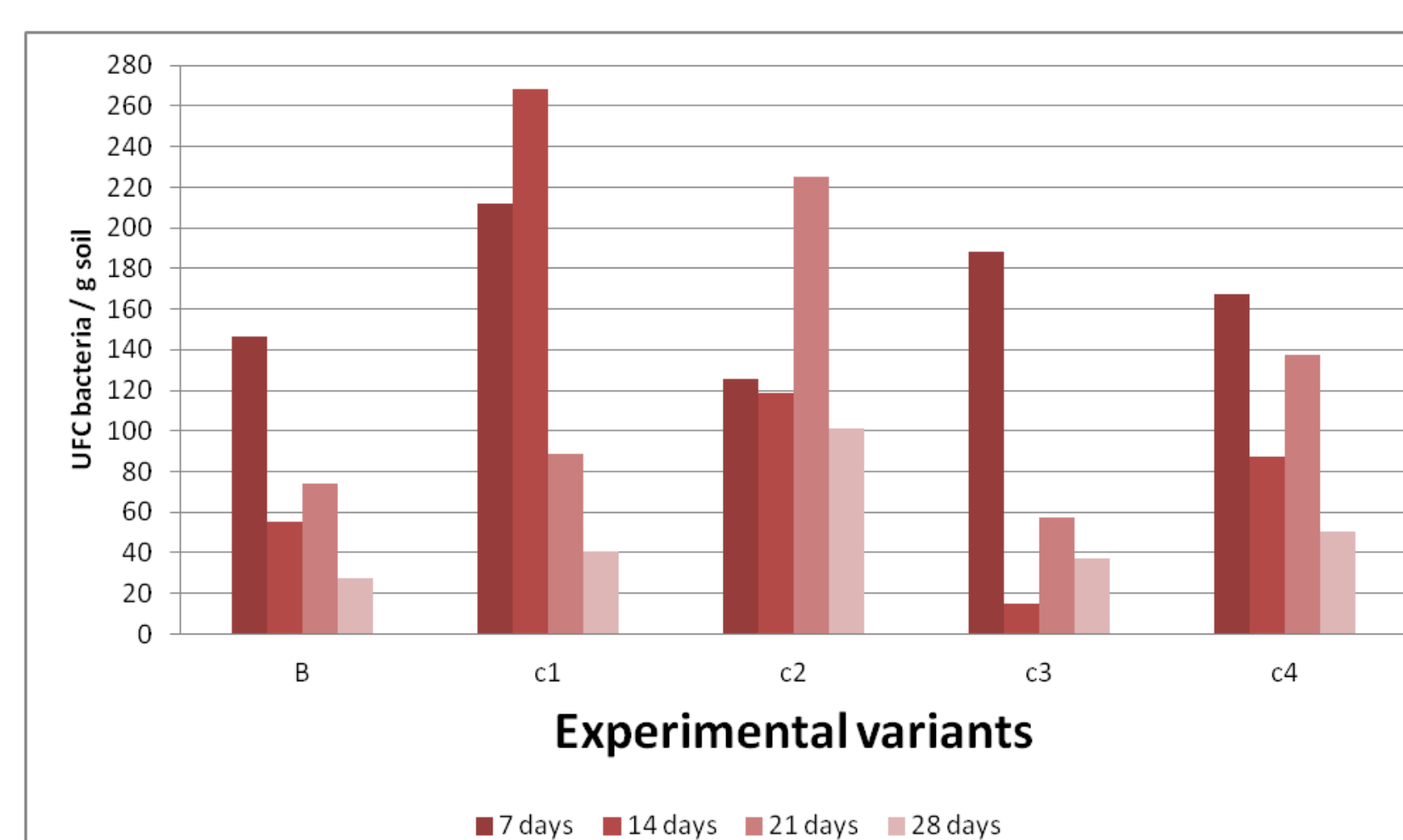


Figure 2. The evolution of bacteria population from the analyzed soil

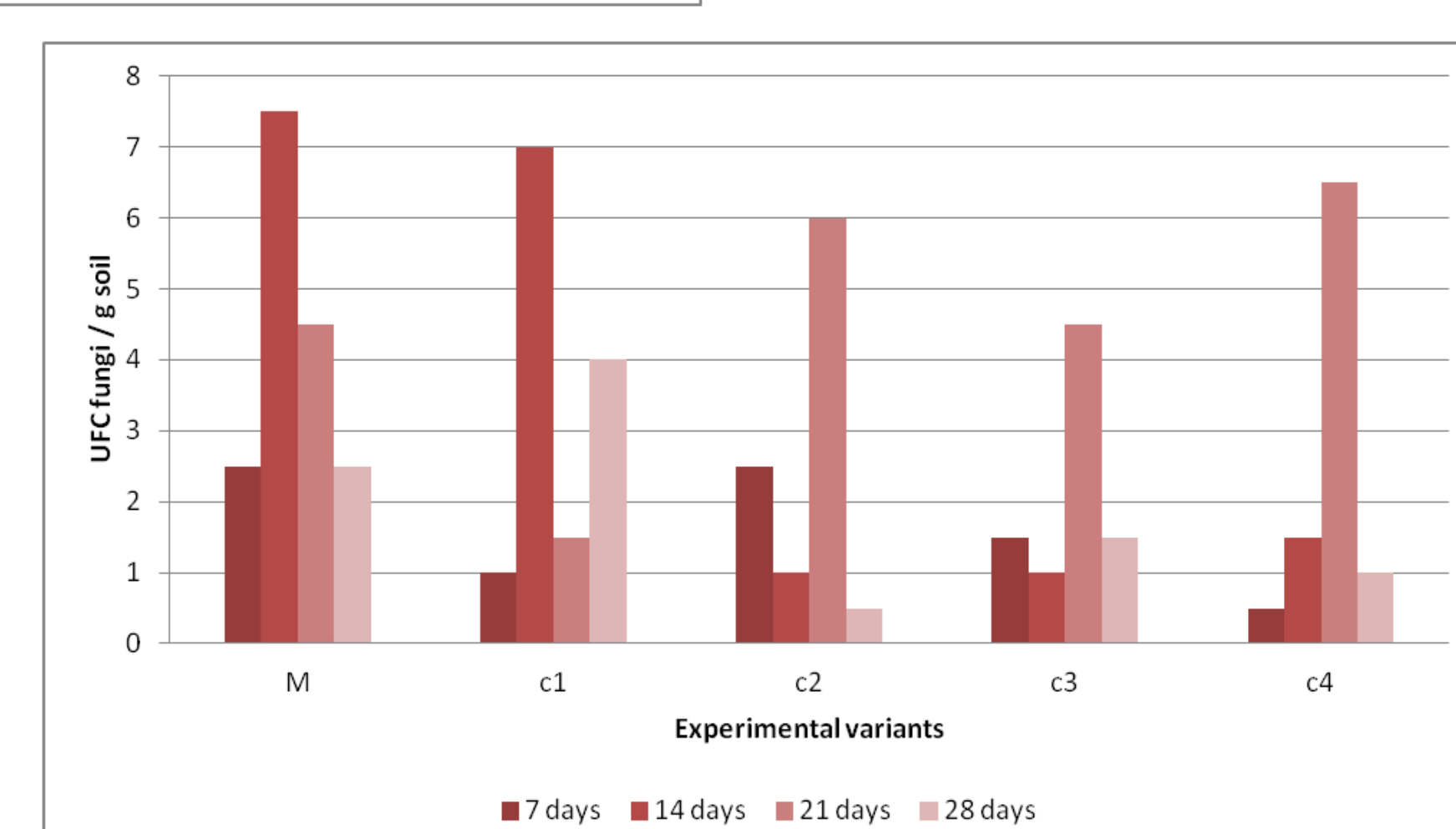


Figure 3. The evolution of fungi population from the analyzed soil