



ANALYSIS OF THE EFFECT OF THE HERBICIDE MDA6 ON THE SOIL MICROORGANISM COMMUNITY

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Abstract: Intensive agriculture in recent years has determined an application with an ever-increasing rate of herbicides to control and combat weeds in agricultural crops, the final role being that of increasing productivity. Herbicides have an important role in modern agriculture, but when used on a large scale, their toxicity, mobility and persistence can lead to their action as pollutants in the soil, groundwater, and the environment in general. In this study, we evaluated the effects of the herbicide MDA6 on the activities of some hydrolytic enzymes and on the populations of microorganisms present in the soil, considering experiments on soil samples maintained under laboratory conditions for 28 days. The herbicide MDA6 contains as active substance 2,4 D dimethyl amine salt in a concentration of 825 g/l, the applied dose being the one corresponding to corn crops. Results obtained from experimental studies, evidence of dose-dependent inhibitory effect of MDA6 against dehydrogenase, catalase, phosphatase, and urease activities. In the case of the communities of bacteria and fungi in the analyzed soil samples, the obtained results reveal a dose-dependent behavior of the populations of microorganisms in the solution treated with MDA6. Colonies of microorganisms register a slight increase after the application of MDA6 herbicide compared to the control soil samples, the increase being reduced when the double dose of herbicide is applied.

• Results and discussions

• Introduction

- ✓ 2,4-d dimethylamine salt is a systemic herbicide used to combat dicotyledonous weeds in agricultural and non-agricultural environments. Herbicide has a wide scope of application and has become a source of environmental pollution.

• 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 eribicid.
- ✓ 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

- ✓ The results obtained in the experimental study highlight an inhibitory effect of the herbicide MDA6 on the enzymatic activities analyzed, the action of the herbicide being dependent on the herbicide dose applied and the exposure time. Also, effect of inhibiting the development of the community of bacteria and fungi in the soil was highlighted, the effects being more obvious with the increase in the dose of the applied herbicide.

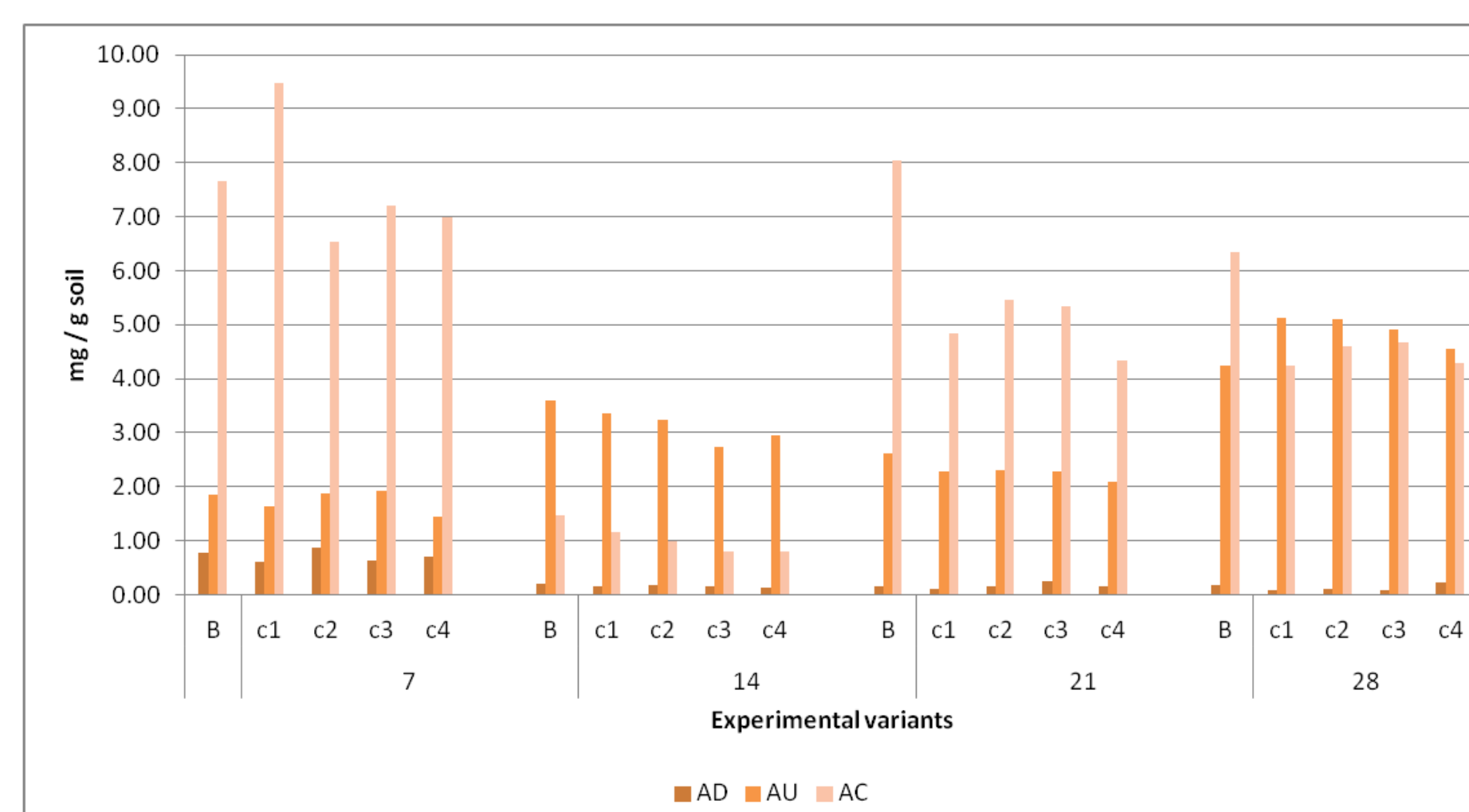


Figure 1. Evolution of enzymatic activities during the experiment (A. DA-dehydrogenase activity, UA-urease activity, CA-catalase activity, B. AF-phosphatase activity, all enzyme activities are expressed in mg/g soil) (B-untreated soil, c1-minimum normal dose-DNmin, c2-maximum normal dose-DNmax, c3- 1/2 maximum normal dose- 1/2DNmax, c4 - 2*DNmax.)

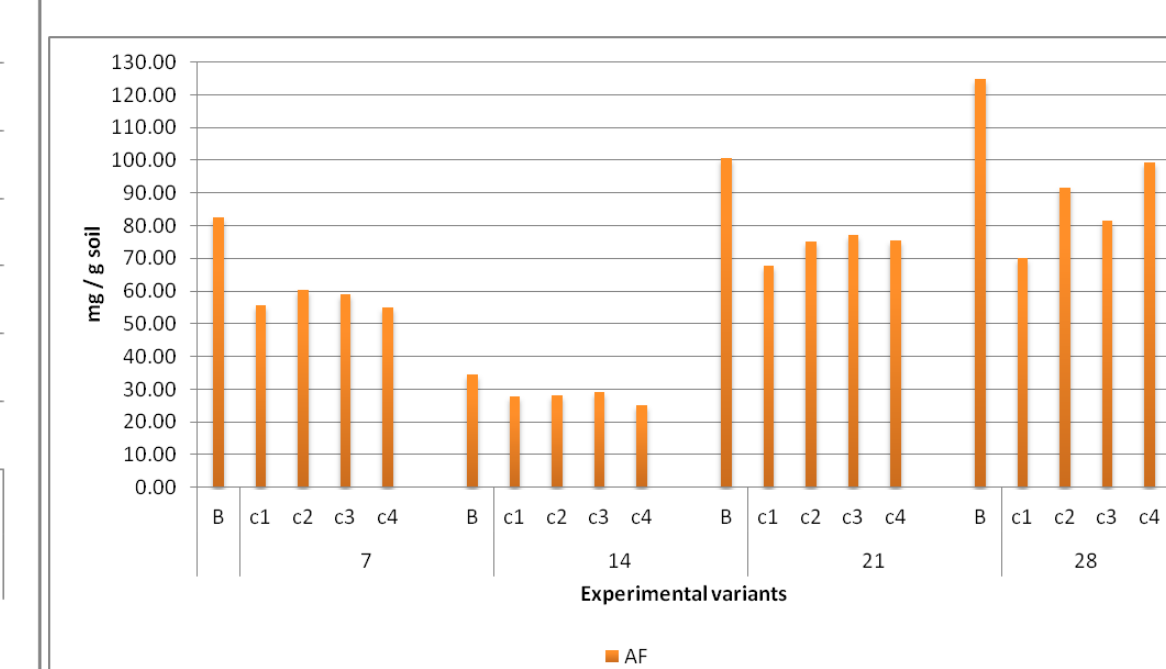


Figure 2. The evolution of bacteria population from the analyzed soil

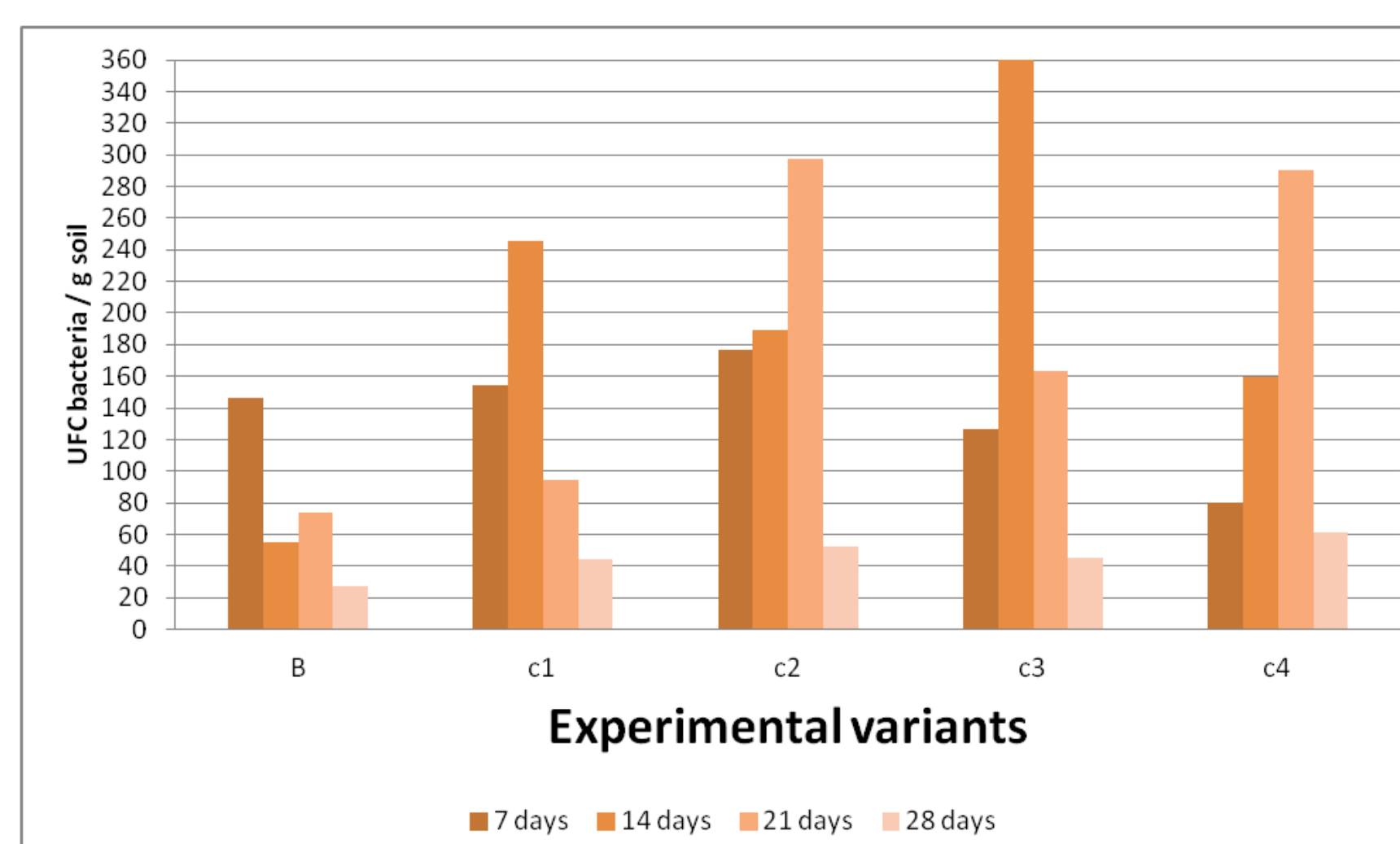


Figure 3. The evolution of fungi population from the analyzed soil

