



ASSESSMENT OF THE EFFECT OF FLUROXIPYR ON THE MICROBIAL ACTIVITY OF THE SOIL

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Abstract: Pesticides are widely used in agricultural crops, with the increase in the use of pesticides, the problem of their possible effects on soil, water, air pollution, contaminating different links of the trophic chain, arises. The population size, enzymatic activity and biodiversity of certain systematic and physiological groups of microorganisms can serve as bioindicators of the changes that occur in the soil after herbicide application. Tomigan is a selective herbicide, used in the fight against annual and perennial dicotyledonous weeds in grass crops and corn, whose active substance is Fluroxipir which belongs to a chemical group of herbicides (pyridine-carboxylic acids) in a concentration of 250 g/l. The evaluation and monitoring of the effect of this herbicide on the soil was carried out based on the determination of the enzymatic activities in the soil and the community of bacteria, respectively fungi in the treated soil under laboratory conditions. The enzymatic activities determined at the soil level were: dehydrogenase, urease, catalase, and phosphatase, and microbiological analyzes allowed the determination of the number of CFU / g soil of the bacteria and fungus. Monitoring was carried out over a period of 28 days from the moment of application of the herbicide. The results obtained in the experimental study showed an inhibitory effect of the tomigan herbicide on the enzymatic activities analyzed, the action being dependent on the herbicide dose applied and the exposure time. The effect of inhibiting the development of the community of bacteria and fungi in the soil was also highlighted, the effects being more obvious with the increase in the dose of herbicide applied.

• Introduction

- ✓ Fluroxypyr (4-amino-3,5-dichloro-6-fluoro-2-pyridinyl-1-methylheptyl ester) is a herbicide widely used to control weeds and fungi. However, its widespread use has led to significant accumulation in ecosystems and contamination of soils and crops.

• 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 fungus 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.

• Results and discussions

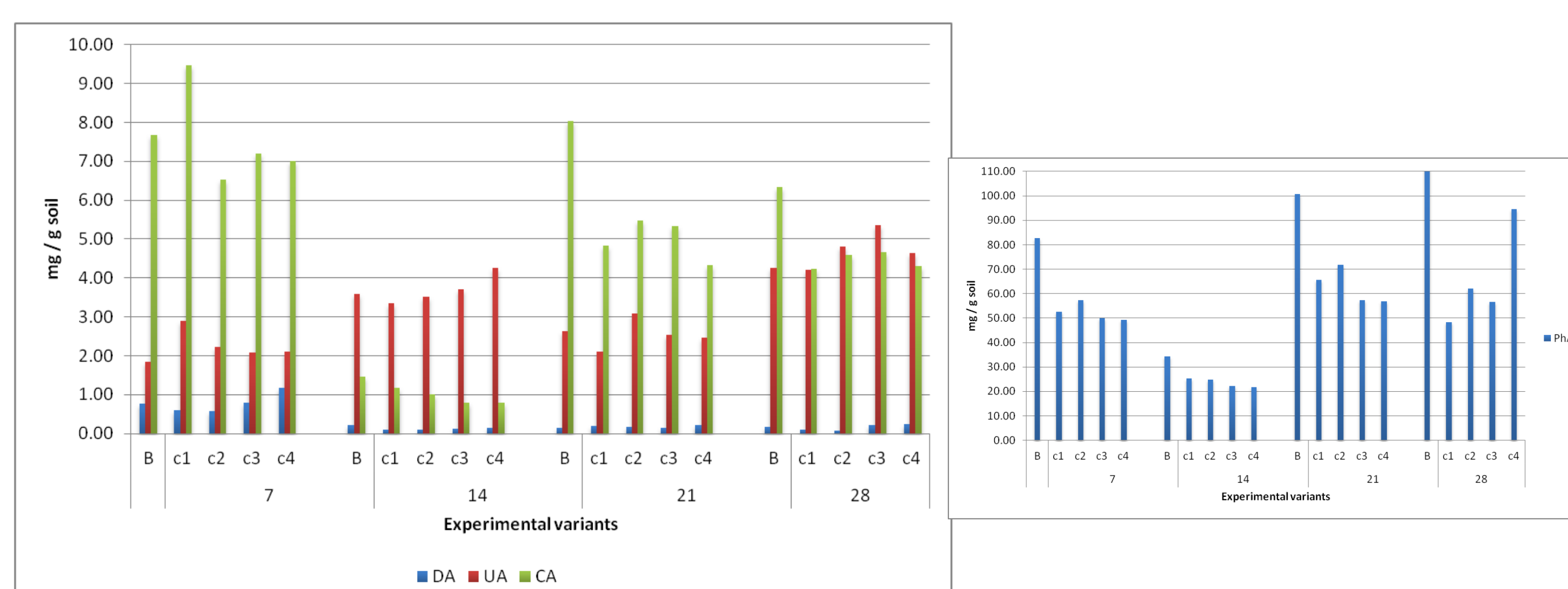


Figure 1. Enzyme activity values determined at the level of soils treated with Tomigan (A. DA-dehydrogenase activity, UA-urease activity, CA-catalase activity, B. AF-phosphatase activity, all enzyme activities are expressed in mg/g soil) (B-untreated soil, c1-minimum normal dose-DNmin, c2-maximum normal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

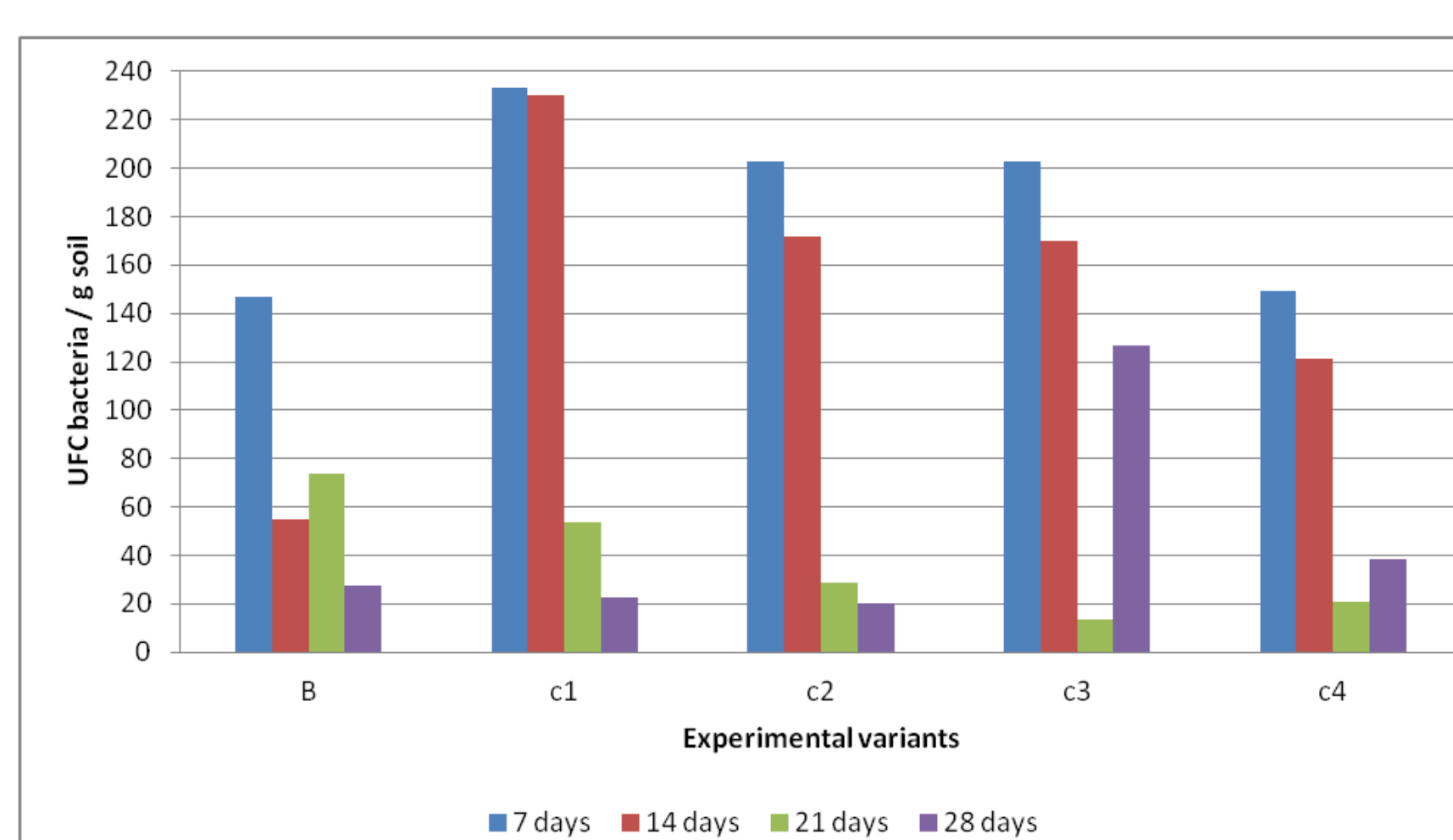


Figure 2. The evolution of bacteria population from the analyzed soil

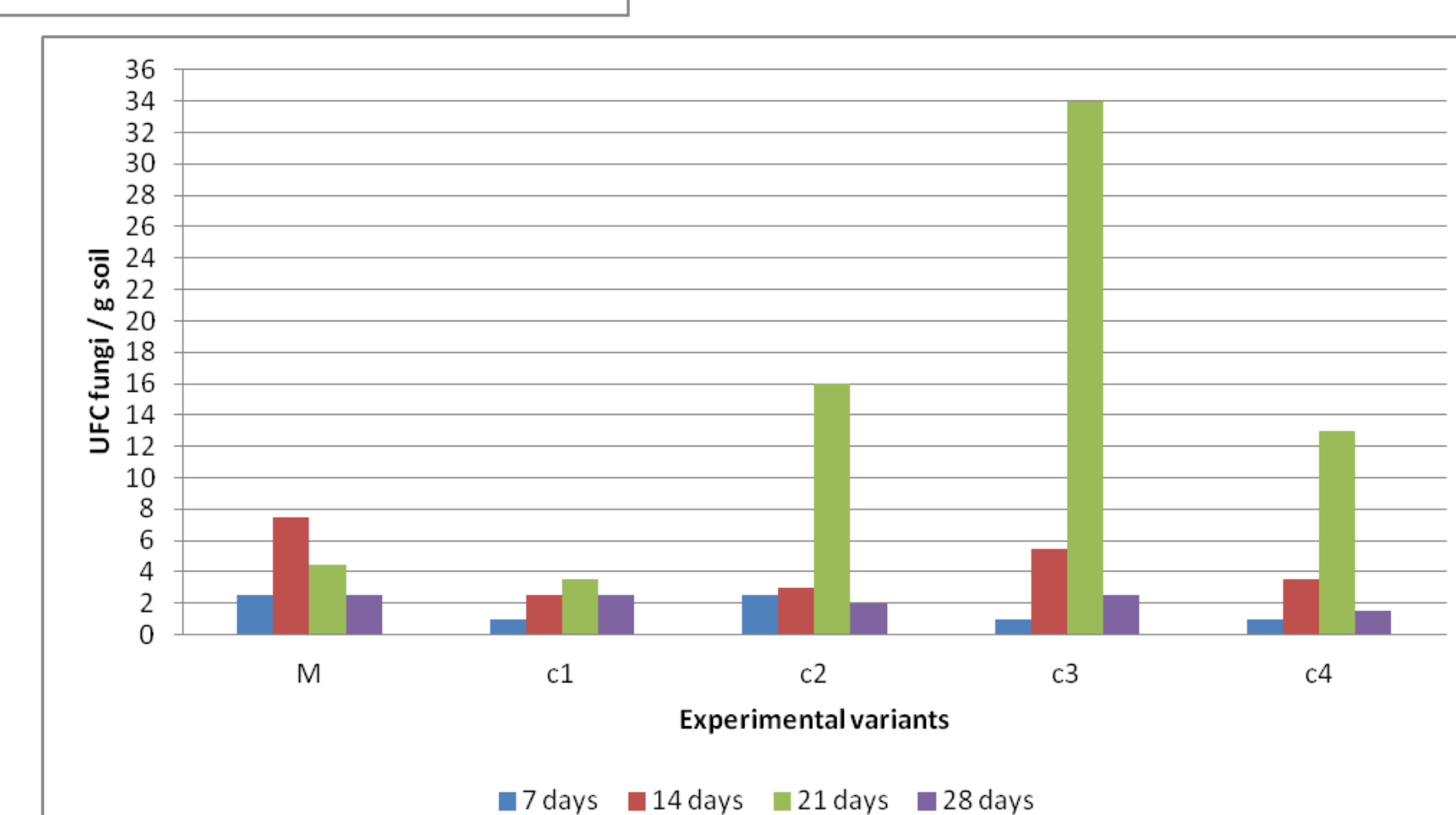


Figure 3. The evolution of fungi population from the analyzed soil

Conclusions

- ✓ Erbicid - Tomigan can affect the function and enzymatic activity of the soil, but without significant changes if the recommended dose is followed. The increase in the dose causes imbalances in the metabolic activities at the soil level, and on the community of bacteria and fungi, with subsequent effects on soil fertility.