



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM
TIMISOARA
"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH
IN APPLIED LIFE SCIENCES"



"Young people and multidisciplinary
research in applied life sciences"

13-14 November, 2025

PRELIMINARY RESULTS ON THE AQUATIC PHYTOTOXICITY OF
DIFENOCONAZOLE ON DUCKWEED (*LEMNA MINOR*)

Cosmina-Alecsia COSMA¹, Diana-Maria ISTRATE¹, Constantina-Bianca VULPE^{2,3}, Bianca-Vanesa AGACHI^{1,3}, Adina-Daniela IACHIMOV-DATCU^{1,3}

¹Department of Biology, Faculty of Chemistry, Biology, Geography, West University of Timisoara, Pestalozzi 16, 300115, Timișoara, Romania

²Department of Scientific Research in Biology, Advanced Environmental Research Institute, West University of Timisoara, Oituz, 4, 300086 Timisoara, Romania

³The Academy of Romanian Scientists, Ilfov 3, 050044, București, România

Abstract: Difenconazole is a widely used triazole fungicide in the European Union. While effective against fungal pathogens, it may pose risks to non-target organisms, including aquatic plants, for instance through rainwater runoff from treated fields. This study provides preliminary data on the phytotoxic effects of difenoconazole on *Lemna minor* (duckweed) using a growth inhibition assay. Ten fronds, organized in colonies of three to four fronds each, were exposed to 30 mL of test solutions at six concentrations: 12.5, 1.25, 0.125, 0.0125, and 0.00125 g/L for 7 days. The results indicated that only the lowest concentrations (0.0125 g/L and below) allowed the survival and growth of green fronds, while higher concentrations led to chlorosis and impaired growth. Colony numbers increased with increasing concentration, but the number of fronds per colony showed that the highest concentration produced effects comparable to the positive control (0.5% zinc chloride). Intermediate concentrations (1.25 and 0.125 g/L) induced colony fragmentation alongside chlorosis, which was not observed at 0.0125 g/L; at the lowest concentration (0.00125 g/L), growth patterns were similar to the negative control. These findings suggest a concentration-dependent phytotoxic effect of difenoconazole on duckweed, affecting both colony structure and frond health. Further research is warranted to confirm these preliminary observations and to elucidate the mechanisms underlying triazole-induced stress in aquatic plants.

• Introduction

In the European Union, difenoconazole is a common triazole fungicide. Rainwater runoff from treated fields, for example, may put non-target creatures, such as aquatic plants, at danger even though it is effective against fungal infections. This study offers initial information on the phytotoxic effects of difenoconazole on the aquatic macrophyte *Lemna minor*, also known as duckweed.

• Material and method

Using a test for growth inhibition, a total of ten fronds, grouped in colonies of three to four fronds each, were exposed to 30 mL of test solutions at five different difenoconazole concentrations:

- 12.5 g/L
- 1.25 g/L
- 0.125 g/L
- 0.0125 g/L
- 0.00125 g/L

Also, there were used two types of control solutions:

- Positive control (ZnCl₂ 0.5%)
- Negative control (culture media)

The test lasted for 7 days.

• Results and discussions

The results showed that green fronds could only survive and grow at the lowest concentrations (0.0125 g/L and below), while higher concentrations caused chlorosis and decreased development. The number of fronds per colony showed that the highest concentration generated effects similar to the positive control (ZnCl₂ 0.5%), but colony numbers grew with increasing concentration. Colony fragmentation and chlorosis were caused at intermediate concentrations (1.25 and 0.125 g/L), but not at 0.0125 g/L. Growth patterns were comparable to the negative control at the lowest concentration (0.00125 g/L).

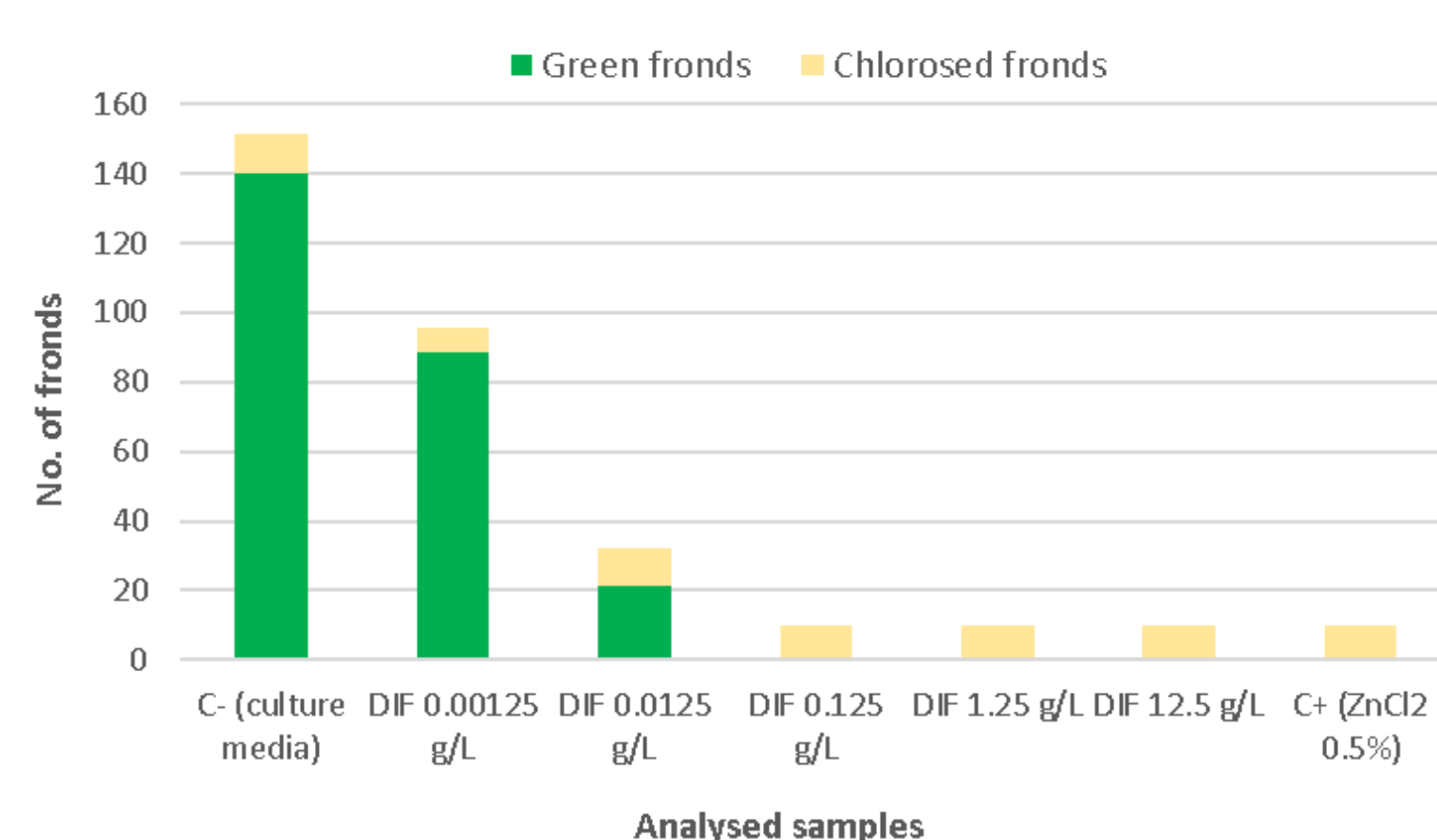


FIG. 1-The number of green and chlorosed fronds for each difenoconazole concentration tested

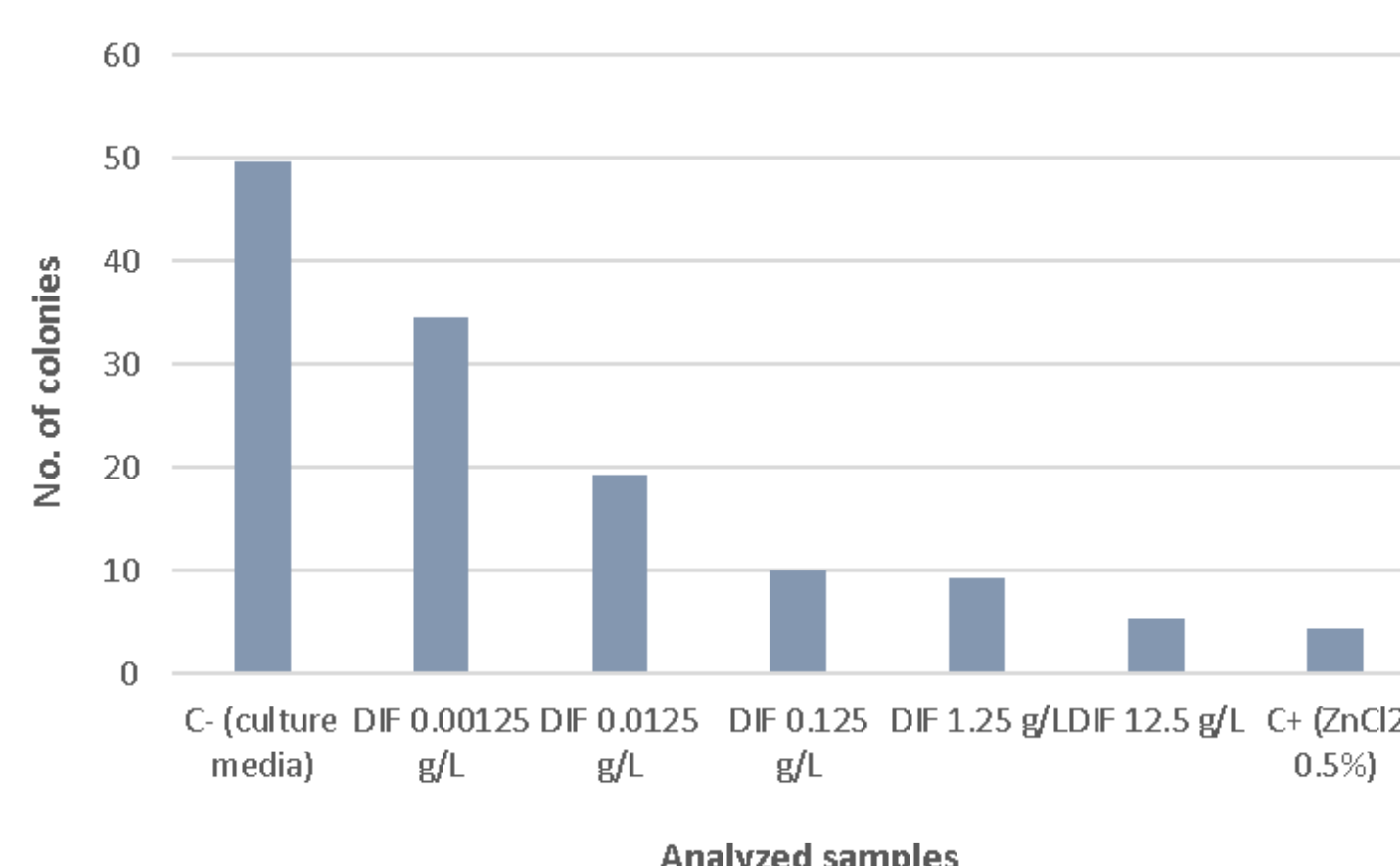


FIG. 2-The number of colonies for each difenoconazole concentration tested

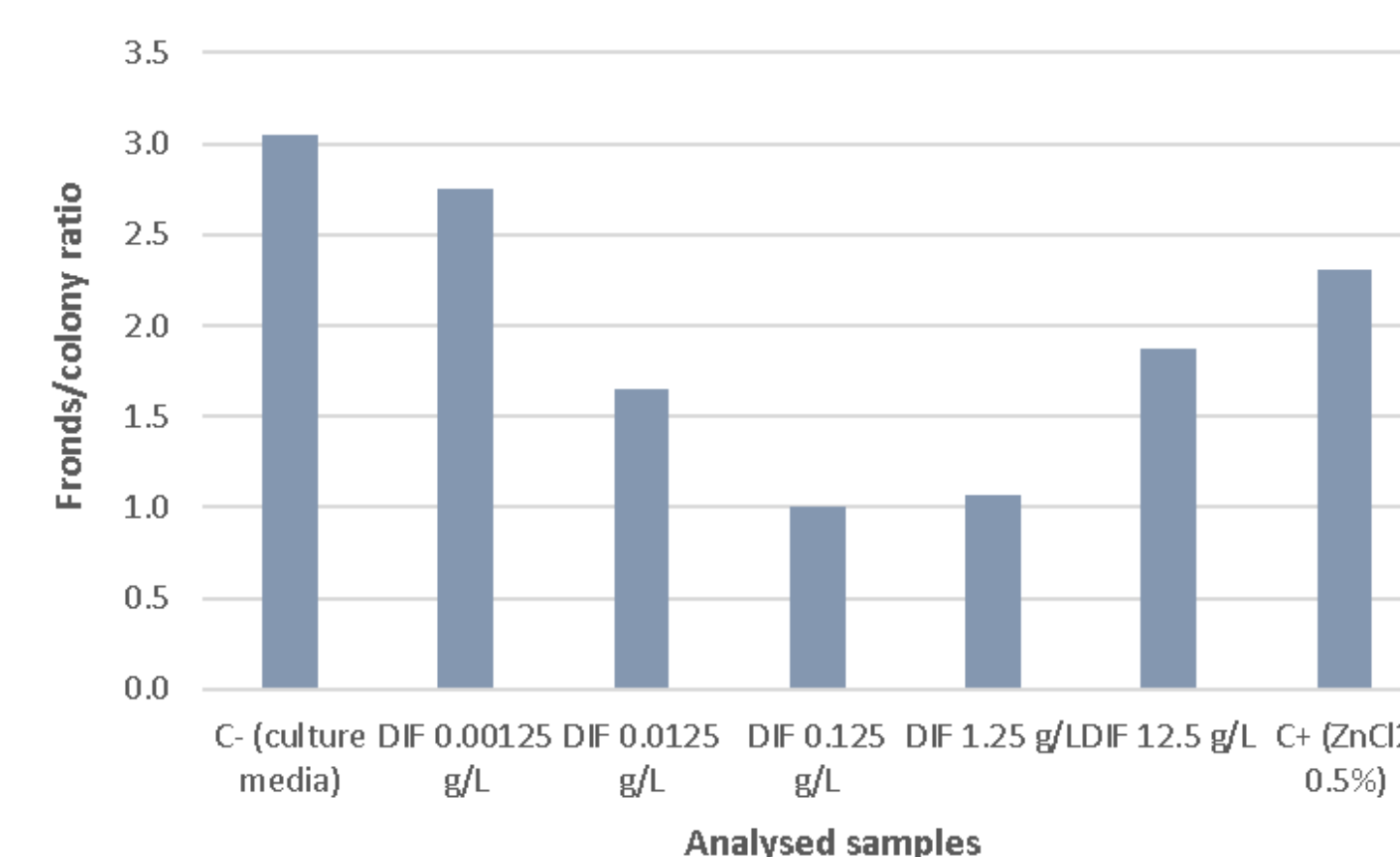


FIG. 3-Fronds/colony ratio for each difenoconazole concentration tested

• Conclusions

These results indicate that difenoconazole has a concentration-dependent phytotoxic effect on duckweed which impacts frond health and colony structure. In order to confirm these first results and understand the processes behind triazole-induced stress in aquatic plants, additional research is necessary.

Acknowledgement: This paper was carried out within the project "Integration of EXperimental and INformatic methodologies in the assessment of TOXicological impact: Investigation of the effects of some triazole fungicides on the environment and human health", acronym EX-IN-TOX, 04.2025-12.2026, funded by The Academy of Romanian Scientists through the Research Project Competition of the Academy of Scientists of Romania for Young Researchers "AOȘR-Teams-IV" Edition 2025-2026 "Digital Transformation in Sciences,,.