

Impact of Pesticides on Amphibian Species from Water Bodies with Varying Degrees of Anthropogenic Influence in Central Bulgaria

PhD Thesis Summary

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This dissertation investigates the direct and indirect effects of pesticides and fertilizers on amphibian species in areas with varying degrees of agricultural activity in Central Bulgaria. The study focused on five key aspects: species distribution in agricultural landscapes, water quality assessments, species diversity analysis, and laboratory experiments examining the impacts of ammonium nitrate and the fungicide Ortiva® TOP SC on amphibian larvae.

Mapping the distribution of five protected amphibian species in Bulgaria for eighteen years (2004–2022) revealed that most populations inhabit agricultural lands, exposing them to intensive farming practices, including pesticide use. Acoustic monitoring in two rice fields and a nearby natural pond near Plovdiv showed higher amphibian abundance in rice fields, emphasizing the importance of these artificial wetlands as breeding habitats. Water analysis from these sites indicated that most parameters met national standards, although elevated nitrate concentrations raised concerns. These findings justified selecting ammonium nitrate for further laboratory testing.

Laboratory experiments assessed the effects of ammonium nitrate and Ortiva® TOP SC on the larvae of the agile frog (*Rana dalmatina*) and the common toad (*Bufo bufo*). Ammonium nitrate exposure resulted in significantly higher mortality, reduced growth, and impaired swimming activity in *R. dalmatina* compared to *B. bufo*, indicating greater sensitivity in the agile frog. Environmentally relevant concentrations of Ortiva® TOP SC also caused significant mortality in *R. dalmatina*, with LC₅₀ values lower than the recommended application rates, suggesting a potential environmental threat. Although swimming activity was less affected by the fungicide, higher concentrations triggered increased movement, potentially leading to higher predation risks in natural settings.

The study highlights the vulnerability of amphibian populations to agricultural pollutants, particularly during sensitive developmental stages. It underscores the need for targeted conservation measures and more sustainable agricultural practices to mitigate the impacts of chemical use on amphibian biodiversity in agricultural landscapes.