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***Allium cepa* as a Model System for Assessing the Phytotoxicity of Food Dye Mixtures: An Integrated Analysis of Growth Rates and Physiological Parameters**

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When Food Dyes Reach Nature: What Plants Can Tell Us About Pollution

A new study published in Plants explores how plants respond to exposure to food dyes and underscores their potential as indicators in environmental pollution assessment.



Synthetic food dyes have become a common presence in everyday life, found in numerous products consumed by millions of people, including cakes, candy, soft drinks, ice cream, and other items whose attractive appearance relies on these additives. Although their use in food products is carefully regulated, few studies have directly examined the impact these substances may have on living organisms once they are released into the environment.

Starting from this question, a recent study conducted within the Faculty of Chemistry, Biology, Geography at the West University of Timișoara by Prof. Dr. Habil. Nicoleta Ianovici and Assist. Prof. PhD Candidate Oana Găinaru investigated **the effects of commercial food dyes on plants, using onion bulbs (*Allium cepa*) as a biological model for assessing the toxicity of chemical compounds**. The Allium test is internationally recognized for its sensitivity and is frequently used in environmental pollution monitoring.

In the experiment, **the bulbs were exposed for 48 hours to solutions prepared from three commercial food dyes commonly used in decorating confectionery products**. The authors monitored the changes affecting plant growth and development, analyzing accumulated biomass, water content, tissue composition, and other physiological indicators that reflect plants' ability to tolerate chemical stress.

The research aimed to investigate plant responses to experimental exposure and to better understand how such substances could affect plant organisms if they enter the environment. The solutions used in the study were prepared from complete commercial products which, in addition to dyes, also contain other additives such as thickening agents, preservatives, or acidity regulators. For this reason, the observed effects cannot be attributed exclusively to the pigments themselves, and further research is needed to clarify these aspects.



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The results showed that **all three types of food dyes influenced plant development, although the intensity of the effects depended primarily on the composition of each dye and less on the concentration used.** The authors observed reductions in biomass accumulation, changes in the balance between water and dry matter in plant tissues, as well as signs of an adaptive stress response. For some of the three dyes tested, the effects were visible even at lower concentrations, suggesting that **certain combinations of additives may affect plant physiological processes more strongly than might be expected.**

However, the authors emphasize that the study does not aim to assess risks for consumers and does not demonstrate that the normal use of these dyes poses a danger to human health.

In a context in which significant amounts of chemical substances enter the environment every year, studies of this kind contribute to a better understanding of how human activities affect ecosystems. Although plants cannot directly signal the presence of pollutants, their biological responses provide valuable information about the effects these substances may have on the environment. They also represent an important tool for monitoring ecosystem quality and developing strategies for environmental protection.

The study was published in the international journal *Plants* under the title "Allium cepa as a Model System for Assessing the Phytotoxicity of Food Dye Mixtures: An Integrated Analysis of Growth Rates and Physiological Parameters" and is available to anyone interested in exploring the topic further here: <https://www.mdpi.com/2223-7747/15/13/1968>



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