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USING EVOLUTIONARY APPROACHES TO PROTECT PLANTS FROM ULTRAVIOLET STRESS

KOLOMIETS Irina, https://orcid.org/0009-0009-5185-6435

Moldova State University, Institute of Ecology and Geography,
Chisinau, Republic of Moldova,
Corresponding e-mail: *ikolomiec71@gmail.com*

Purpose. The escalating race to explore near-Earth space, leading to ozone layer depletion, and the violation of international agreements on its use could lead to irreversible, catastrophic consequences on a global scale. Theoretical modeling of ultraviolet stress has shown that a 10% decrease in ozone levels can lead to a 15-20% increase in UV irradiation. A decrease in the productivity of both artificial and natural plant communities is one of the most significant changes caused by exposure to elevated doses of UV radiation. Therefore, protecting plants from UV stress is a priority goal of modern science. An evolutionary approach has been adopted as the methodological basis for the search for plant protectors against UV stress. Considering that the first photosynthetic organisms arose during a period when the ozone layer was underdeveloped, protective mechanisms against UV radiation should have evolved. We hypothesize that bioluminescence may be such a mechanism. An endogenous organic fluorophore, *Acidum salicylicum*, has been proposed as a protector against UV stress. It can absorb electromagnetic radiation in the UV range and emit it in the visible range.

Materials and methods. The studies were conducted on genetically homogeneous material of maize (*Zea mays* L.). Experimental maize seeds pre-soaked in water were placed in Petri dishes and irradiated with a BOP-9 apparatus with PRB-8 lamps in the range of 180-280 nm, a power of 10 W, radiation energy of 300, 600, 900, 1200 W·s, a radiation dose of 5000, 1000, 15000 and 20000 J/m^2, with an exposure of 30, 60, 90 and 120 s at a distance of 1 m.

Results. Our research showed that pre-sowing treatment of maize seeds with a UV dose of 20000 J·s/m² has an effect throughout the entire developmental period, leading to a 20–25% yield reduction. Soaking *Zea mays* L. seeds in an aqueous solution of *Acidum salicylicum* at a concentration of 32 mg/L mitigates this effect. The protective effect was observed both in laboratory and field conditions. In the field, seed treatment, soil drenching, and spraying of plants with a fluorophore during the

virginal stage of development were used. The maximum protective effect under UV stress was observed when soaking seeds in an aqueous fluorophore solution.

Conclusion. The use of organic fluorophores with absorption maxima in the ultraviolet and visible ranges will reduce the risk of reduced productivity in both artificial and natural plant communities under conditions of increased solar radiation.

Keywords: protection, plants, maize, plant community, ultraviolet stress, evolution, fluorophores, solar radiation.

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