UDC: 632.95:504.06 DOI: https://doi.org/10.53040/ppap2026.63

CONCEPTUAL FOUNDATIONS OF THE ENVIRONMENTAL SSESSMENT OF CHEMICAL PROTECTION OF AGRICULTURAL CROPS

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The rational use of plant protection products (PPPs) is one of the key components of sustainable agriculture that is, the creation of resilient and productive agrocenoses that prevents environmental pollution. The deterioration of the phytosanitary situation in recent years, linked to climate change, is leading to the transformation of agrocenoses, a shift in the species composition of dominant pest complexes, increased crop losses, and more acute problems with chemical control and, consequently, to an increase in the potential environmental risks associated with pesticide use.

In Ukraine, the issue of environmental risk assessment is considered in the context of environmental safety, where an important scientific task is the environmental assessment of pesticides (environmental hazards and risks associated with their use) in order to predict, prevent, and reduce their negative impact on the environment and human health in the context of achieving the Sustainable Development Goals. Safety issues are effectively addressed through the rational use of pesticides based on environmental assessments to develop a portfolio of new active ingredients; selecting the optimal, economically viable, and environmentally sound option for chemical protection for each crop under specific growing conditions and phytosanitary status; ensuring a stable supply of high-quality agricultural products as a fundamental factor in food security; and protecting the environment. Therefore, the goal of such research is to create a methodological framework for the chemical-analytical and ecotoxicological monitoring of pesticides in agrocenoses, to establish a system of criteria for their rational and environmentally safe use to protect agricultural crops from harmful organisms; to identify the environmental hazards and risks associated with the use of pesticides in agricultural technologies (based on a system of informative and representative criteria).

A multilevel conceptual system of criteria for assessing the environmental risks of pesticide use in crop cultivation technologies has been developed, with the following key indicators:

- toxicological and hygienic (LD_{50}) and ecotoxicological (T_{50}) aspects of pesticide use;
- the integrated hazard level (Cn) and the weighted average potential hazard level (Q);
- the territory's tolerance based on the self-purification index (Izon), which is closely linked to the HTC and climate change and reflects the intensity of pesticide degradation in a specific soil-climate zone (in Ukraine, ranging from 0.23 - very weak to 0.8 - intense);
- seasonal pesticide load (H, kg/ha);
- the environmental risk of chemical pest control (AETI—agroecotoxicological index), which ranges from 0 to 10 and serves as a key environmental criterion in the concept of integrated crop protection against harmful organisms, allowing the risk of pesticide use to be determined as early as the planning stage.

Such scientifically grounded methodological approaches to assessing environmental risks and the established environmental indicators allow for a comprehensive evaluation of the environmental safety and environmental risk associated with pesticide use in crop cultivation technologies, which serves as the basis for developing environmentally oriented zonal systems for crop protection.

Keywords: pesticides, environmental assessment, agroecotoxicological index