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Assessing the Environmental Impacts of Pesticides: A Case Study from Armenia

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ABSTRACT

This research investigates the impacts of pesticides use on the soil-plant-fungi-animal chain in Armenia, shedding light on the environmental consequences of such practices in the region. Data sampling has been conducted from 2022 to 2023, during spring, summer and autumn seasons on 3 different locations: Gogaran, Arevshat and Lichk in Armenia. It was recorded a total 95 species of micromycetes. Our study reveals that pesticides have negative impact on various species within this ecological network. During potato cultivation using pesticides, it was noted that the diversity of micromycetes was reduced. Notably, they influence both harmful and beneficial micromycetes. As a result, some beneficial species of Mucoromycetes were destroyed, which led to the emergence of a resistant pathogenic fungal species *Agroathelia rolfsii*. While the overall species richness of molluscs remains relatively stable 12 species, the abundance of terrestrial molluscs was different in the control and pesticides used locations. Additionally, we observed genotoxic effects of pesticides on *Georginapaeous hohenackeri* with high levels of DNA damage in pesticide used plots. Using two model tests of Tradescantia - Trad-SHM (stamen hair mutations of Tradescantia) and Trad-MN (micronuclei in tetrads of plant microspores), a significant increase in the level of mutation events was shown in all three experimental soil variants compared to their background ones. These findings highlight the importance of adopting sustainable agricultural practices to mitigate negative impacts on non-target species and preserve biodiversity, thereby ensuring the integrity of ecosystems and underscoring the urgent need for stringent pesticide regulation and monitoring the usage in Armenia.

Keywords: environmental health, pesticides regulation, sustainable agriculture, pollution monitoring, DNA damage, genotoxicity

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References:

1. Sharma, S.; Kaur, I.; Nagpal, A.K. Pesticides in agriculture: Food security vs. food safety. *Adv. Food Secur. Sustain.* **2024,** *9*, 59–73. DOI:10.1016/bs.af2s.2024.07.010
2. Tudi, M.; Daniel Ruan, H.; Wang, L.; Lyu, J.; et al. Agriculture development, pesticide application and its impact on the environment. *Int. J. Environ. Res. Public Health* **2021,** *18*, 1112. DOI:10.3390/ijerph18031112

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