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Toxicological Studies as a Tool to Restore Environmental Conditions

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Editorial

Before starting with the topic on toxicological studies and their role in environmental protection, let us go through some of the basic definitions. According to one definition, ecology is the scientific study of how abiotic forces and biota interact to shape the distribution and abundance of species. The study of how harmful chemicals and physical factors affect living things is known as toxicology (Singh, 2022). A specific individual organism or community of organisms is considered to be in its environment if all the abiotic components such as air, soil, and water as well as all the biotic components such as plants and animals are present. Ecotoxicology is the study of how toxic substances behave and impact ecosystems (Alryahii and Jasim, 2022; Khangotra, 2022; Sardana et al., 2022). Instead of focusing on the impacts on a single creature, it tries to link how harmful substances affect populations and communities in a certain environment. There are differences in the results or effects on various species when the toxicant in issue is investigated on a variety of species. As a result, many ecotoxicological studies now focus solely on one species at a time to examine the effects of a toxicant.

Acute toxicity tests in labs

How helpful are these tests for acute toxicity, has been questioned by many researchers. Numerous ecotoxicologists claim that the advantages of these tests lie in their ability to recreate certain environmental conditions in the lab, which allows for the evaluation of acute toxicity afterward. Whether these acute tests provide useful information on how a certain substance affects individuals and communities is a related question. The other species are not taken into consideration if testing is done on a specific species. Because of this, there is always some debate over their accuracy or the usefulness of extrapolating from one species to another. But that study on a single species, provides a piece of information which will be helpful in creating the compilation of toxic effects of a particular compound on different species.

Tests in Lab Vs. Natural systems

A particular organism is chosen for ecotoxicity testing based mostly on its high level of sensitivity to chemical substances. Ecotoxicological studies usually ignore size and physiological variations. The exposure periods of many chemicals in natural systems are also likely to be significantly longer than in commonly performed standard laboratory experiments since many of these compounds are persistent. As a result, this is where the toxicological studies are presumed to fall short. Again, these studies, despite the lab conditions, provide useful information about the animals and their behaviour after exposure to a particular concentration of the compound under question.

Expansion of Ecotoxicological studies

Ecotoxicology is expanding in two different directions. First, research is being done to determine how a compound affect different animals. This includes the primary or core studies on compounds in question using an animal model. In the second, extrapolation of the effects seen in one creature is modeled in order to forecast the effects in a different organism. If the effects are found to be similar in a group of animals, either invertebrates or vertebrates, the compound is treated as toxic and is further investigated.



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Toxicological studies and formulation of new laws

Nowadays, more emphasis is being laid on pollutant discharges into the atmosphere and their effects on organisms including heavy metals, nanoparticles, microplastics (Singh, 2022) and many more. This field of research is a great step towards restoration of environmental conditions, especially in developing countries with least implemented laws for environmental protection purposes. These studies also help to formulate new environmental laws in a particular area to restrict use of hazardous chemicals, production of a pollutant including nano-products or a specific pesticide and discharge of specific effluents to conserve environmental conditions. Conclusively, toxicological studies, in spite of their type, are directly or indirectly helping in finding the exact and true status of the environmental conditions. Thus, the need for more such toxicological studies, either with positive or negative results, is always recommended.

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