



A REVIEW: IMPACT OF PESTICIDES ON THE ENVIRONMENT

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Different types of pesticides are available in the market, and they are used to kill the pests and insects which are harmful on the various agricultural crops. Till date, the majority of developing and non developing countries are widely using pesticides for controlling the insect pests. The various kinds of pesticides play crucial role in the agricultural field, and they are beneficial to human property and also protect the various crops. But, its excessive use causes harmful effect on the biodiversity. Their excessive uses also directly and indirectly affect the human beings, terrestrial animals, aquatic organisms, microorganism, and other beneficial insects besides, other organisms. The present paper is briefly reveals the impact of pesticides and insecticides on the environment.

**KEY WORDS :** *Pesticides, Environment, Biodiversity, Agricultural crops.***INTRODUCTION:**

The various kinds of pesticides and insecticides are rich amounts of hazardous substances used to control the pests in various agriculture crops. These pesticides include various types of chemicals used by farmers widely. There are a large varieties of pesticides and are used to kill the target species, which are namely 1) Insecticides (they are used for the control the insect pests, and are made by organochlorines, organophosphates and carbamates and these category is also used as insect repellents), 2) Herbicides (are also known as weed killers and they are chemical substances used to kill the unwanted plants, also they contain some selective types of category used for controlling the specific weed species), 3) Fungicides (it is used mostly against mould or fungi and they are used as wood preservatives), 4) Rodenticides (it is pesticide that is used for the controlling the mice, rats and moles), 5) Fumigants (these are the chemical substances used to kill the insects, nematodes and other animals and that are particularly used in the closed storage places) and 6) other pesticides (they include algaecides, miticide and acaricides, and these are mostly used to kill the algae, moths and ticks). Pesticides have several benefits to farmers which are used in various strategies such as agricultural, veterinary, domestic and institutional; they are available in different formulations such as liquid, gel, paste, chalk, powder, granules, pellets and baits. In India 76% of the pesticides are used as an insecticide as against 44% globally (Mathur, 1999) ^[1]. Such pesticides constitute any substance or mixture of substances. They are planned for preventing, destroying, repelling, or mitigating any pest. They can also serve as plant defoliant and regulators (USEPA) ^[2]. Even though their benefits, pesticides can be dangerous to both humans and the environment. Innumerable chemicals are environmentally stable, prone to bioaccumulation and toxicity (Fenik 2011) ^[3], as several pesticides can persevere in the environment and they can stay there for years. Environmental contagion or occupational use can expose the universal population to pesticide residues, as well as physical and biological degradation products present in the water, air, and food (Mostafalou and Abdollahi, 2013) ^[4]. In this paper, we tell in a few words the impact of pesticides and insecticides on the

environment.

BENEFITS OF PESTICIDES:

Pesticides have many benefits which comprise the primary benefits i.e. the killing of larvae feeding on a variety of crops and bring the superior yields in crop growing field. There are two types of benefits of pesticide that are used specifically primary and secondary. Various primary benefits of pesticides are scheming pests and plant disease vectors, livestock disease vectors and scheming organisms which are dangerous to other person behavior and structures. The primary benefits are connected with straight gains from the use of pesticides and secondary benefits are connected to the long term effects (Cooper and Hans, 2007)^[5]. The pesticides benefits consist of amplify in food production; enlarge in profits for farmers and the avoidance of diseases. A variety of pesticides are helpful for scheming the medical pests which are extremely damaging to the human beings. They play significant role in agricultural field and helpful to recover the quality and quantity of food material which are produced in huge quantities by producing more crops. They boost the farmer's profit, save money on labor costs and in count to saving crops and livestock. Such pesticides have also had direct benefits to human health.

Impact of pesticides on the environment and human health:

Insecticides and pesticides arrive at the environment through different processes like application and preparation. Depending on the pests, Application of pesticides has different techniques depending on nature of paste, i.e. formulation type, the controlled pest and the application timing. In the agriculture field, normally various kinds of pesticides and insecticides are useful to control the crop pests. Liquid sprays are mostly used in agricultural crops such as tunnel sprayers, boom sprayers etc. In addition, a variety of regular pesticides are used on the crops. In the soil, granule form of pesticides is used and injected as a fumigant. Chemicals are sprayed onto the soil surface^[6]. After relevance, pesticides can pollute water, soil, turf, air, food and other plants. They sprayed from one place to another and they had direct or indirect impact on wild animals.

They are bare to human beings by means of drinking water, respiration and food materials. According to Miller (2004),^[7] the impact of pesticides on the environment, consist of the effects of pesticides on non-target class. They have an effect on non targeted species; in excess of 98% of sprayed insecticides and 95% of herbicides turn up at a target further than their target species, as they are spread from corner to corner of entire farming fields. Function of pesticides causes extremely damaging effect on the aquatic animals, human being and birds, frequently all pesticides unswervingly affect advantageous insect such as bees and reproductive system of fishes. Basically, many kinds of pesticides fetch into aquatic environments through wind action to grazing areas, human settlements and immature areas and potentially have an upshot on other species, additionally other troubles come out from poor manufacture, transportation and storage practices, Tashkent (1998)^[8]. In this method, there is an cherished association among pesticides and insecticides in the recent world. They are involved in causing severe environmental evils particularly for aquatic ecosystem.

According to, (Pronczuk et al, 2002)^[9] pesticides are originating from breast milk and are cross the placenta. They have been detected in breast milk, which are residues of organochlorine pesticides, POPs including DDT, HCB. A number of isomers like HCH have been found in breast milk. And they conclude that breast milk might be infected and represents the very top of the food-chain. A small number of pesticides are found in the amniotic fluid and body tissues of human fetuses even during early stages of prenatal life. Whyatt et al. (2001)^[10] have observed pesticides in meconium. Pesticides cause different problems for human health, particularly for farmers and workers in a pesticide company, namely, acute toxicity: Allergic sensitization (e.g. fungicides), Irritation (most of the pesticides), Enzyme inhibition (e.g. cholinesterases and OPs and carbamates), Inhibition of neurotransmission, Oxidative damage (e.g. paraquat), and Uncoupling of oxidative phosphorylation (e.g. glyphosate) and acute toxicity: dermal and ocular irritation, Upper and lower respiratory tract irritation, Gastrointestinal symptoms, allergic responses and asthma (fungicides), Neurological symptoms, and Bleeding, and Caustic lesions and pulmonary fibrosis, Specific syndromes like Cholinergic crisis,^[11, 12, 13]. The overpowering facts of some of these chemicals do simulation which causes potential risk to humans and other living organisms and needless side effects to the surroundings (Jeyaratnam, 1985, Igbedioh, 1991, Forget, 1993)^[14-16]. According to data released by the, World Health Organization and the

UN Environment Programme, it is predictable that every year, 3 million workers in agriculture in the developing world experience cruel poisoning from pesticides, about 18,000 of whom die.^[7] On account of insufficient regulation and safety precautions, 99% of pesticide connected deaths happen in developing countries that account for only 25% of pesticide usage.^[17] Jeyaratnam J (1990) ^[18]. According to another study, 25 million workers in developing countries might suffer due to mild pesticide poisoning. Recently, 20 farmers are died of pesticide poisoning in Maharashtra; over 1,800 are exaggerated after spraying pesticides in their cotton field and further 1,800 farmers have been affected by the breathing of these lethal pesticides (<https://www.deccanchronicle.com>). According to Times of India, 7 poisonous pesticides of the world have barred are still used in India, which are extremely damaging to the living organisms (<https://timesofindia.indiatimes.com/india/7-deadly-pesticides>).

Air pollution:

Recently, large amount of Pesticides are causal to air pollution. They are poised in the air as particles which are accepted by the wind from one place to other areas, potentially contaminate them. ^[19] Frequently, all insecticides are extensively used to control the pests of the agricultural crops, but they can volatilize and move to other areas by wind action, but they are potentially dangerous to wildlife animals. The quantity of pesticides is entered in the body during respiration that is a main risk to human being and other domestic animals, but it depends on the season. Pesticide revelation can cause a diversity of adverse health effects, ranging from simple irritation of the skin and eyes to more severe effects such as affecting the nervous system.

Water pollution:

The pesticides from agriculture field mixed in the water causes intimidation to aquatic biota. Pesticide residues in rain and groundwater are entered in the human body and other animals, causes severe problems to human beings and dangerous to the aquatic organisms ^[20]. 98% of sprayed insecticides and 95% of herbicides appear at a target rather than their target species, together with non-target species, air, water and soil. ^[21]

Soil pollution:

Every type of pesticides is frequently mixed in the soil during different ways which decrease the common biodiversity. It is directly and indirectly effect on the soil bacteria and also they are harmful to the helpful species which are helpful for fertility. Many chemicals used in pesticides contains soil contaminants, whose crash stand for decades and inadequately influence soil preservation. ^[22] Further, the various types of chemicals present in pesticides which are persist in the soil and that result on organic matter in the soil allows for higher water retention. ^[23]

Effect on plants:

More number of pesticides is present in the soil, which is the held up on the nitrogen fixation are helpful for the growth of higher plants. The different kinds of the insecticides are used against pests which are namely methyl parathion, DDT, and pentachlorophenol. They are interfering with legume-rhizobium and particularly on the yield of crop. The larger part of green plants depends on the bees for pollination, but pesticides can kill bees and are powerfully concerned in pollinator decline. Pesticides used for crops can kill honeybees, ^[19] which act as pollinators.

Effect on animals:

In general, the predominance of all pesticides is harmful to the numerous kinds of animals. The most dangerous pesticides are water and fat soluble, which are simply elated from the target area into ground water and streams as the pesticides get dissolved in the water and fat soluble pesticides are simply entered in the insects, fish, and other animals, often ensuing in extended perseverance in food chains. They are very injurious to the birds, aquatic life and human's life in different ways. Some pesticides are fat soluble, which cause severe problems in reproduction of aquatic biota and also they damage ecosystems, decrease biodiversity, damage or harm un-targeted animals, cause a decline in populations or even cause the extinction of species and disturb the natural balance in ecosystems. Several terrestrial flora and fauna are necessary in

digesting organic material and raise nutrient content at surface of soil and ultimately protect human property, but pesticides have had damaging effects on development and reproduction of those animals. Some pesticides can persist or build up toxic levels in the bodies of organisms that consume them over time, a phenomenon that impacts species high on the food chain especially hard.^[19] Pesticides can enter the body through inhalation of dust and vapor, aerosols, through oral exposure by consuming food and water, through skin exposure by direct contact etc.^[24] Pesticides exude into soils and groundwater, which can end up in drinking water and pesticide spray can drift and pollute the air. The effect of pesticides on human depend on the toxicity of the chemical and the length and magnitude of exposure.^[25] Farmers and their families practices the maximum exposure to agricultural pesticides through direct contact.

CONCLUSION:

Pesticides have many benefits to the farmers and peoples all around the world by increasing agricultural yield and by providing numerous benefits to society ultimately. But, it's additional use creates various hazardous effects on human health and the environment. Pesticides are threats to biodiversity, human health, aquatic animals, and terrestrial animals. They are directly damaging the environment, non-targeted organisms that may be useful or important, and damage food chain. There is thus every reason to develop health education packages based on knowledge, aptitude and practices and to disseminate them within the community in order to minimize human exposure to pesticides.

REFERENCES:

- [1] Mathur SC., Future of Indian pesticides industry in next millennium, *Pesticide Information*, 24(4), 9-23 (1999).
- [2] USEPA - United States of Environmental Protection Agency About pesticides, U.S. EPA. <http://www.epa.gov/pesticides/about/index.htm>, (2014).
- [3] Fenik J, Tankiewicz M, Biziuk M., Properties and determination of pesticides in fruits and vegetables, *Trends in Analytical Chemistry*, 30 [6], 814-826 (2011).
- [4] Mostafalou S, Abdollahi M., Pesticides and human chronic diseases: Evidences, mechanisms and perspectives., *Toxicology and Applied Pharmacology.*, 268, 157-177 (2013).
- [5] Cooper Jerry and Hans Dobson. "The benefits of pesticides to mankind and the environment" *Crop Protection*, 26, 1337-1348., (2011).
- [6] Van Der Berg F, Kubiak R, Benjey WG, Majewski MS, Yates SR, Reeves GL, Smelt JH. Emission of pesticides into the air. *Water, Air & Soil Pollution.*, 115, 195-210 (1999).
- [7] George Tyler Miller. *Sustaining the Earth: An Integrated Approach.*, Thomson/Brooks/Cole., 211–216 (2004).
- [8] Tashkent Part 1. Conditions and provisions for developing a national strategy for biodiversity conservation. Biodiversity Conservation National Strategy and Action Plan of Republic of Uzbekistan. Prepared by the National Biodiversity Strategy Project Steering Committee with the Financial Assistance of The Global Environmental Facility (GEF) and Technical Assistance of United Nations Development Programme (UNDP)., (2007).
- [9] Pronczuk J et al. Global perspectives in breast milk contamination infectious and toxic hazards. *Environ Health Perspect*, 349, 110, (2002).
- [10] Whyatt R M, Measurement of organophosphate metabolites in postpartum meconium as a potential biomarker of prenatal exposure. A validation study. *Env Health Perspect*, 2001, 109:417.
- [11] American Academy of Pediatrics Committee on Environmental Health. Pesticides. Chapter 24. In: Etzel RA. ed. *Pediatric Environmental Health*, 2nd Ed. Elk Grove Village IL. American Academy of Pediatrics, 2003.
- [12] Salameh PR et al. Respiratory symptoms in children and exposure to pesticides. *Eur Respir J* , 2003,22:507.
- [13] Sanborn MD et al. Identifying and managing adverse effects: 4 Pesticides. *CMAJ*, 2002, 166:1431. Pictures: Courtesy of Dr. J. Pronczuk. Lesion caused by paraquat.
- [14] Jeyaratnam J. (1985). Health problems of pesticide usage in the third world. *B M J* 42: 505.

- [15] Igbedioh SO. (1991). Effects of agricultural pesticides on humans, animals and higher plants in developing countries. *Arch Environ Health* 46: 218.
- [16] Forget G. (1993). Balancing the need for pesticides with the risk to human health. In: *Impact of Pesticide Use on Health in Developing Countries*. Eds. Forget G, Goodman T and de Villiers AIDRC, Ottawa: 2.
- [17] "www.who.int" (PDF).
- [17] "www.who.int" (PDF).
- [18] Jeyaratnam J (1990). "Acute pesticide poisoning: a major global health problem". *World Health Stat Q* 43 3): 139–44. PMID 2238694.
- [19] Cornell University. Pesticides in the environment. Pesticide fact sheets and tutorial, Pesticide Safety Education Program. Retrieved on 2007-10-11.
- [20] Bingham, S (2007), Pesticides in rivers and groundwater. Environment Agency, UK. Retrieved on 2007-10-12.
- [21] Miller GT (2004), *Sustaining the Earth*, 6th edition. Thompson Learning, Inc. Pacific Grove, California. Chapter 9, Pages 211-216.
- [22] U.S. Environmental Protection Agency (2007), Sources of common contaminants and their health effects. *Epa.gov*. Retrieved on 2007-10-10.
- [23] Kellogg RL, Nehring R, Grube A, Goss DW, and Plotkin S (February 2000), Environmental indicators of pesticide leaching and runoff from farm fields. United States Department of Agriculture Natural Resources Conservation Service. Retrieved on 2007-10-03.
- [24] California Department of Pesticide Regulation (2008), "What are the Potential Health Effects of Pesticides?" Community Guide to Recognizing and Reporting Pesticide Problems. Sacramento, CA. Pages 27-29.
- [25] Lorenz, Eric S. (2009). "Potential Health Effects of Pesticides" (PDF). *Ag Communications and Marketing*: 1–8. Retrieved February 2014.
- <https://www.deccanchronicle.com>
- <https://timesofindia.indiatimes.com/india/7-deadly-pesticides>