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Pesticide impacts on wildlife and human-mini review

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SUMMARY

A drug or combination of compounds intended to prevent, control, or lessen the harm caused by a pest is known as a pesticide. Rodents, weeds and insects are frequently managed with the help of pesticides. These chemical substances can be effective against pest species and are widely available, but they also pose dangers to the health of people and the environment. Particularly if they are not used or kept appropriately, several pesticides can be harmful to animals.

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INTRODUCTION

Pesticides are the chemicals or a mixture used to control, prevent, destroy or kill any type of pest like human and animal's vectors, causing diseased, undesirable species of animals and plants caused for harm during or may interfere with the production, ripening of crops, storage processing, transportation, marketing of food as well as grains, agriculture, wood and wood articles or may be animal feed or ingredient, administered to the animals for insect control, arachnids or any other pest causing for illness in their bodies, according to FAO (Raina and Hamid, 2013). This term also covered extensive range of the compounds i.e. Herbicide, fungicide, insecticides, plant growth regulators, rodenticides and others as well (Johnson and Albright, 1992).

Aspelin (1997) also defined the pesticides and elaborated that these are the means utilized in killing or controlling of the unwanted pests such as insects, herbs, weeds, rodents, bacteria, fungi, bacteria or any other harmful organisms containing insecticides, rodenticides, herbicides, bactericides, fungicides as well as fumigants, purifiers and food preservatives. These pesticides are capable killing pests, reducing the level of vector borne diseases with lower cost providing better quality things and service to the society and the general public, as these compounds play vital role in agriculture, industry, home, garden and health sector to control the pest. According to an analysis by the (Pimentel and Burgess, 2014) about $10 billion are ecological and social damages due to pesticides impact upon public health, crop pollination and honeybees habitat losses, livestock death and dairy product losses, crop product loss, bird, fish (aquatic habitat loss) an other wildlife animal losses and pesticide

destruction to natural enemies (Predators birds etc.) and development of resistance in pest against the pesticides.

Pesticides are available in many forms i.e. spray, tablet, gases, liquid and granules etc. they are applied to agriculture fields gardens, grasslands, forests and aquatic habitat. The revolution in the greens, a large variety of pesticides is introduced to the environment. These entered the ecosystems and affect the plant & animals life exerting serious life and ecological problems as some of them, have longer life in the environment and carry on the synergizing affect with pesticides causing serious health and ecological problems. They are characterized upon their function as herbicidal, rodenticide and insecticide or upon chemical nature i.e., pyrethroids, phenylurea, organophosphate and dithiocarbamates etc (Agarwal and Singh, 2014).

The use of pesticides especially chemical pesticides is on large scale in agriculture and food safety for controlling pest, mites, fungi and insects (Cooper and Dobson, 2007). Organophosphorus pesticides among the chemical pesticides are utmost widely used worldwide and also available for native as well as industrial purposes (Jaga and Dharmani, 2003). In modern era, the use of pesticides is become inevitability but regular and unjustified use such chemicals resulted in many detrimental secondary consequences upon plants as well as to the ecosystem. Especially developing countries like Nepal, insecticides are being used in high concentration than that the recommended dosage of them, that is warning against their cytotoxic and genotoxic affects (Pandey and Sakya, 2009).

Pesticides and rodenticides are extremely effective at controlling mouse and rat populations, as well as termites and weeds, but they represent substantial threats to animals. Pesticides can kill animals that are not the intended target, such as hawks, owls, squirrels, skunks, deer, coyotes, foxes, mountain lions, and bobcats. Non-target animals can be exposed directly by consuming bait products that have been left out for pest species or that have not been properly kept, or indirectly by eating prey that has pesticide in its body tissues. These poisons can not only harm wild creatures, but they can also disturb hormones in mammals, impacting behaviour and reproduction. Furthermore, while most pesticides degrade quickly, certain pesticides degrade slowly and remain in the environment for an extended period of time. These are referred to as persistent insecticides. Some pesticides can accumulate in the bodies of animals, including humans. Pesticides can also destroy natural enemies of pest insects. The natural function of streams and ponds can be altered by unintentional spraying of ditches and rivers, runoff from sprayed farms, and reckless container dumping (Dolan and Mannan, 2009).

BIRDS

Many farmland bird species have experienced significant population and range declines over the last four decades. These have been related to agricultural intensification, which has manifested itself as a series of changes in farmland practise. One of these is increased pesticide use. Concern has shifted from pesticides' direct deadly or sub-lethal impacts on birds, such as losses in sparrow-hawks due to decreasing eggshell thickness caused by the use of organochlorine insecticide seed treatments in the 1950s and 1960s, to pesticides' indirect effects. These indirect

impacts mostly act through a decline in food supplies. In addition to reducing the abundance of target invertebrates and weeds, pesticides and herbicides can decrease the availability of non-target and beneficial species. This is primarily due to insecticide use producing a decrease in the availability of insect food, as well as herbicide use causing a decrease in weed seed abundance and a fall in insect abundance owing to host plant loss (Bright et al., 2008).

Granivorous agricultural birds have had the greatest decreases. In the winter, these birds eat seed food, but in the summer, when they also eat invertebrates, they feed their chicks insect food. As a result, discussions of farmland bird feeding frequently centre on summer bug food and winter seed food. However, two species, the turtle dove and the linnet, are totally granivorous, and their diets have changed considerably since the beginning of agricultural intensification, shifting from weed seeds to grain seeds (Bright et al., 2008).

MAMMALS

Schauber *et al.* (1997) investigated whether differences in non-target organism diets or vegetation structure could cause adverse ecological effects. Researchers introduced populations of herbivorous omnivorous deer mice (*Peromyscus maniculatus*) and gray-tailed voles (*Microtus canicaudus*) in “24 0.2-ha” alfalfa (*Medicago sativa*)-planted enclosures and monitored them using live trapping. Researchers mowed alfalfa in twelve enclosures to lower vegetation height, and “3 weeks” later, we administered “azinphos-methyl” at “0”, “0.88”, and “3.61” kg/ha. Researchers compared risk estimations to observed impacts on small mammals. In both mowed and unmowed enclosures, azinphos-methyl treatment at "3.61 kg/ha" decreased vole population density and growth, survival, recruitment, and body growth. The 0.88 kg/ha treatment only had an impact on male vole body growth in mowed enclosures, where female vole survival was lower than in unmowed enclosures. Following spraying, vole concentrations in cages at "3.61" kg/ha were low for "6 weeks." The reproductive activity of female voles was unaffected by azinphos-methyl. It's possible that the subsequent precipitation increased the animals' exposure to "azinphosmethyl," leading to greater effects on voles than had previously been observed in a study of a comparable kind. Deer mouse populations in mowed enclosures receiving "3.61 kg/ha" of spray decreased by "47 percent" after five days. Although the other negative pesticide effects on deer mice were not statistically significant, their confidence intervals were wide. The intake of arthropods immediately after spraying was greater in insecticide-treated enclosures than in controls, according to an analysis of deer mouse faeces. The Quotient Method correctly anticipated impacts on small animals in general, but the structure of the vegetation and the amount of precipitation may affect.

HERPETOFAUNA

Concerns regarding the reduction of particular amphibian populations, as well as the protection of amphibians and reptiles, have heightened awareness of pesticide-related issues. Testing amphibians and reptiles as a prerequisite for chemical registration has been advocated, but because to the phylogenetic diversity of these animals, this is problematic. Literature and research data may be used to establish if present testing

for mammals, birds, and fish effectively safeguard amphibians and reptiles. According to existing data, amphibians are unpredictably more resistant to particular cholinesterase inhibitors. Pesticide research on amphibians and reptiles should compare responses to existing studied groups and strive to identify taxa and chemicals for which cross-group prediction is not achievable. New amphibian and reptile tests should rely on existing data bases to the greatest extent possible, and they should be designed for maximum economy and little injury to test animals. A approach for gathering the necessary information is proposed. Good field testing and monitoring of chemicals in use may compensate for predicted evaluation shortcomings and eventually lead to enhanced tests (Hall and Henry, 1992).

FISHES AND AQUATIC ANIMALS

From October to December 1971, the effects of pesticides on fish and birds in Surinam rice fields were studied. Large fish fatalities were recorded following the use of NaPCP to reduce Pomacea snail populations. Fifty snail kites that feed solely on these snails were discovered dead after substantial application of NaPCP, and high pentachlorophenol levels were identified in tissues of 17 of those examined. During the pesticide treatment period, egrets, herons, and/or jacanas were found unwell or dead. The presence of pentachlorophenol and endrin in these birds suggested that consuming contaminated food was a likely cause of the illness and mortality observed (Vermeer et al., 1974).

HUMAN

Many chronic diseases in humans may be brought on by or made worse by the use of pesticides in various nations, particularly if exposure is protracted and sub-lethal. Despite available information, it is hard to predict how a chronic pesticide load would affect people based on research with experimental animals. In response, Morgan and Roan4' emphasised that it is crucial to keep in mind that human pesticide excretion is slower than that of dogs, cats, and monkeys when extrapolating toxicity numbers from experimental animals to people. Maybe it was overestimated how hazardous these compounds may be to people. The systemic consequences of chronic pesticide absorption are not believed to be taken into account. Epidemiologic evidence of increased risks, such as cancer, vascular disease, and mouth harm, is difficult, if not impossible, in many circumstances. Furthermore, given man's multi-decade lifespan, the potential for certain substances to induce all of these consequences may be underestimated (Morgan and Roan, 1971; de Campos and Olszyna-Marzys, 1979; Morgan, 1980; Igbedioh, 1991; Cimino et al., 2017). The most serious issue is a lack of biomarkers for evaluating pesticide exposure. Furthermore, there is a growing body of scientific evidence indicating that there are important windows when chemical assaults may be more detrimental to the development of the baby, and the findings show that pesticide exposure may be connected with fetal death (Kim et al., 2017).

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