

Pesticides Boon or Bane

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Introduction

Pesticides are being used more often in agriculture. Pesticides are frequently seen as a quick, convenient, and low-cost alternative for eliminating weeds and insects, pests in agriculture, and other sectors. Our country has an agrarian economy in which the vast majority of the population works in agriculture and pesticides are used to increase productivity. Pesticides have become obsolete in agricultural production (Gupta, P.K. 2004). Pesticides are used in the production of approximately one-third of agricultural products (Lin C.J. Men W.J. Lin, Y.J. *et al*, 2002). Pesticides have polluted nearly every aspect of our ecosystem. Pesticide residues are present in soil, air, and surface and ground water, and their pollution poses major dangers to human health, the environment, and insects. Pesticide residues are present in soil, air, and surface and ground water, and their pollution poses major threats to human health as well as the environment, insects, plants, fish, and birds, among others. Insects cause the most agricultural damage, followed by diseases and weeds. As a result, pesticide usage in agriculture has become a fundamental aspect of crop production in many places, with often very high levels and a haphazard pattern of application (Atreya, 2007, Devi, 2010, Shetty *etal* 2010). Pesticides have also contributed to an increase in the number of cases of brain disorders and other acute chronic diseases in recent years (Abdollahi, Ranjbar, Shadina, Nikfar and Rezaie, 2004). According to WHO estimates, 3 million instances of acute pesticide poisoning occur worldwide each year (Mittal. K. and Vishwakarma, 2014).

India is now the leading producer of pesticides in Asia and ranks twelfth in the world in terms of pesticide use. Pesticides are a severe concern not only in India, but across the world. Pesticide health impacts have long been a contentious issue across the world, and they have been acknowledged as a severe public health concern in recent decades. In her book "Silent Spring," Rachel Carson reported the deaths of birds due by indiscriminate pesticide (DDT) spraying in 1962. Farmers are now completely dependent on these pesticides, and

their indiscriminate and excessive usage in agriculture has resulted in major health consequences. This book sparked considerable concern about pesticides' effects on human health and the environment. DDT was prohibited in 1972 in U.S.A. Following that, other countries stopped using (Lengoodset, *al*, 2007, cited in Bernadsetal 2015). Pesticides are thought to have killed around 800,000 individuals in underdeveloped nations since the beginning of the green revolution. Each year, about 20,000 individuals die as a result of pesticide intake through their food (Bhardwaj and Sharma, 2013).



Pesticides Definition

Pesticide, according to the Cambridge definition, is a chemical agent used to eliminate hazardous insects, small animals, wild plants, and other undesirable species. Pesticides are chemical compounds used to kill pests such as insects, rodents, fungus, and invasive plants (weeds). Pesticides are used to kill vector diseases such as mosquitoes, as well as pests that damage crops in agriculture (W.H.O). Pesticides are defined by the Food and Agriculture Organization (FAO) as any substance or mixture of substances intended for preventing, destroying, or controlling any pests, including vectors of human and animal diseases, unwanted plant or animal species causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products, or animal feedstuffs, or substances that may be administered.

Classification of Pesticides Based On Their Purpose:-

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| Algicides | Kill algae in lakes, canals, swimming pools, water tanks and other sites. |
| Antifoulants | Kill or repel organisms that attach to underwater surfaces such as barnacles that cling to boat bottoms. |

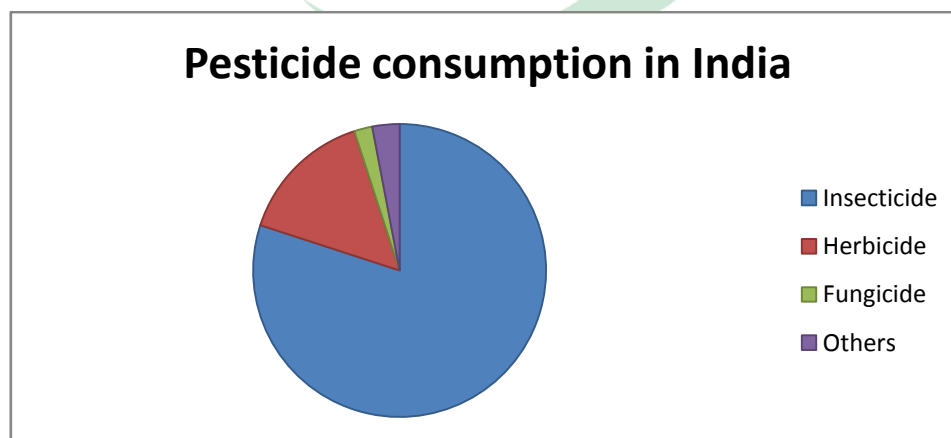
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| Antimicrobials | Kill organisms such as bacteria and viruses |
| Attractants | Lure pests to a trap or bait, for example, attract an insect or rodent into a trap. (However, food is not considered a pesticide when used as an attractant.) |
| Biopesticides | Are derived from natural materials such as animals, plants, bacteria and certain minerals |
| Biocides. | Kill microorganisms. |
| Defoliants | Cause leaves or foliage to drop from a plant, usually to facilitate harvest |
| Desiccants | Promote drying to living tissues, such as unwanted plant tops. |
| Disinfectants and sanitizers | Kill or inactivate disease-producing microorganisms on inanimate objects. |
| Fungicides | kill Fungi (including blights, mildews, molds and rusts). |
| Fumigants | Produce gas or vapor intended to destroy pests, for example in buildings or soil. |
| Herbicides | Kill weeds and other plants that grow where they are not wanted. |
| Insect growth regulators | Disrupt the molting, maturing from pupal stage to adult or other life processes of insects |
| Insecticides. | Kill insects and other arthropods |
| Miticides (also called acaricides) | Kill mites that feed on plants and animals. |
| Microbial pesticides | Are microorganisms that kill, inhibit, or out-compete pests, including insects or other microorganisms' pests. |

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| Molluscicides | Kill snails and slugs |
| Nematicides | Kill nematodes (microscopic, worm like organisms that feed on plant roots). |
| Avicides | Kill eggs of insects and mites. |
| Pheromones. | Disrupt the mating behavior of insects |
| Plant growth regulators | Alter the expected growth, flowering or reproduction rate of plants (does not include fertilizers). |
| Plant Incorporated Protectants | Are substances that plants produce from genetic material that has been added to the plants. |
| Repellents | Repel pests, including insects (such as mosquitoes) and birds |
| Rodenticides | Control mice and other rodents. |

Source: EPA (Environmental Protection Agency, 2012)

Usage of pesticide in India:-

India is the world's second largest producer of pesticides. It is also a big exporter, accounting for 5% (3.4 billion USD) of global pesticide exports in 2019, making it the fifth largest exporter behind China, the United States, Germany, and France. However, India accounts for just 1% of worldwide pesticide usage. In India, insecticides account for 75% of pesticide usage, with fungicides accounting for 12% and herbicides accounting for 10%. Despite the fact that the 'per hectare consumption' is relatively modest in comparison to the rest of the nations, indiscriminate use (in terms of amount and time) remains a concern.



Source De Arnab, 2014

Benefits of Pesticides

- Pest and plant disease vector control
- Managing disease vectors and nuisance organisms in humans and cattle.
- Managing organisms that endanger other human activities and buildings

Improving productivity:

Pesticide usage has yielded enormous advantages in forestry, public health, and the home realm – and, of course, agriculture, a sector on which the Indian economy is heavily reliant.

Protection of crop losses/yield reduction:

In medium land, rice yield reductions owing to weeds ranged from 28 to 48 percent, based on comparisons that included control (weedy) plots, even under puddle circumstances throughout the key time, necessitating an effective and cost-effective weed management approach. Weeds diminish dry land agricultural output by 37–79 percent. Weed infestation, particularly in the early stages of crop establishment, ultimately accounts for a 40% production drop. Herbicides benefited both the economy and the labour force.

Quality of food

It has been observed in first-world nations that a diet rich in fresh fruits and vegetables greatly outweighs the possible dangers of eating crops with extremely low pesticide residues. Eating fruits and vegetables on a daily basis appears to lower the risk of many malignancies, high blood pressure, heart disease, diabetes, stroke, and other chronic illnesses.

Other areas – transport, sport complex, building:-

Pesticides, particularly herbicides, are widely used in the transportation industry. Herbicides and insecticides are used to keep the turf on sports fields, cricket grounds, and golf courses in good condition. Insecticides prevent termites and other wood-boring insects from causing damage to houses and other wooden structures.

Impact of pesticides on plants, animals and human health:-

Pesticide exposure is lethal to animals since it not only affects their bodies but also their behavior. There have been several reports of pesticides causing birth malformations in infants, neurotoxicity impacting brain functioning, endocrine system disturbance, adverse effects on women's reproductive health, and is now being regarded a major cause of cancer.

Farmers are more prone to suffer from long-term brain damage and moderate cognitive problems. Pesticides also have an impact on children, causing brain damage and developmental issues. When a pregnant woman is exposed to pesticides, her unborn child suffers from mouth cleft, neural tube problems, heart defects, and limb abnormalities.

Pesticides include three compounds classified as category 1 carcinogens, meaning they cause cancer. Animal research revealed a link between glyphosate (insecticide) and uncommon kidney and pancreatic tumours. When cells were exposed to glyphosate, the DNA underwent unexpected alterations. Pesticides have an influence on plants as well, despite the fact that they are meant to protect plants against pests. The nutritious content of the produce is jeopardised, as is the health of the land. Pesticides, which are sprayed to protect fruits and vegetables from insects and other pests, can infect them. Pesticides are employed to destroy pests rather than to harm humans.

Conclusion:-

It is stated that prevention is better than cure. Chemical pesticides increase output, but the detrimental effects of their use become apparent only over a lengthy period of time. Earth has always had a remedy for everything it has ever made, but not for the substances humans have found and used. If pesticides are used irresponsibly, they can become as lethal as a weapon. They not only hurt the environment, but they also poison the soils and impair their fertility, affecting plant development. Plants will eventually be unable to grow, resulting in the end of life on Earth. Pesticides can be beneficial if administered correctly, which is only feasible if the individual applying them is highly trained and does so under tight supervision. These hazardous chemicals are to blame for rising illness occurrences and declining biodiversity, and eliminating them from our systems by becoming natural is the only option accessible.

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