



Pesticides – Its Problems and Prospects

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Abstract:

The long half-life of pesticides and their possible environmental hazard have led to a rise in soil and water contamination from their breakdown products. Consumers' awareness of the possible health impacts of artificial chemicals in food has grown in recent years. The primary goal of the introduction of pesticides was to prevent and manage diseases and insect pests in field crops. Naturally, at first, the use of pesticides decreased pest activity and cleared the path for an anticipated increase in crop output. Concurrently, the augmented use of chemical pesticides has led to environmental pollution, with multifaceted long-term consequences for civilization. The purpose of this research is to explore the potential benefits of utilizing pesticides as well as their drawbacks. The research comes to the conclusion that, in order to reduce the use of synthetic pesticides, it is imperative to support organic farming methods and look for biological pesticides or bio-pesticides that may effectively manage agricultural pests.

Keywords: *Products, Potential Health, Food, Society.*

Introduction:

Food is the most vital resource needed to survive. It gives the body the energy and nutrition it needs for development, upkeep, repair, and production. Enough food has never been produced to satisfy the needs of the world's population. Farmers worldwide deal with a few biotic and abiotic concerns regarding the process of generation. The damage caused by various insects and weeds greatly reduces crop productivity. More than 10,000 insect species and 30,000 weed species¹. The widespread use of chemical pesticides has been encouraged despite its unexpected costs because of the benefits they provide to agriculture, particularly in protecting crops from insect damage. The term "pesticide" refers to any substance or combination of substances intended to prevent, eradicate, or control any irritation, including vectors of human or animal disease, undesirable plant or animal species, and substances that cause harm to or generally interfere with the production, preparation, storage, transportation, or promotion of food, horticultural products, wood and wood products, animal feedstuffs, or substances that may be administered to animals for the control of bugs or ot According to the US Environmental Protection Agency, pesticides are substances used to manage weeds as well as pests².

¹ Dhaliwal *et al.*, 2010

² US-EPA, 2018

The goal of sustainable agriculture is to lessen pest and disease outbreaks to the point that they do not significantly harm crops without throwing off the natural equilibrium of the environment. It is well recognised that natural pesticides are harmless for all target creatures and the environment, even though both synthetic and natural pesticides are widely employed in agricultural areas to control crop pests³. Without a doubt, the use of synthetic pesticides has helped some nations accomplish the green revolution by increasing agricultural productivity. Due to environmental degradation and the country's tropical climate, India's agriculture faces significant losses from pests. The complete lack of actinomycetes in Andhra Pradesh and Karnataka was caused by the careless use of synthetic chemical pesticides and fertilisers. As a result, the use of environmentally friendly biopesticides is becoming more popular following a serious setback caused by the use of these chemicals on living systems and the environment. Reduce the usage of conventional pesticides while using botanical pesticides in integrated pest control programmes. Additionally, when used in a rotational manner or in conjunction with other insecticides, botanicals may reduce the total amount of pesticides used, which might prevent or postpone the development of resistance in pest populations. Thus, in order to combat insect pests, farmers worldwide want efficient and alternative techniques⁴.

Literature Review:

According to the report "Prospects for using pesticides in agriculture," manufacturers of pesticides in Europe and throughout the globe are under a lot of pressure to lower the amounts of pesticide residues in food owing to worries about food safety. "This study aims to evaluate the use of conventional pesticides and their consequences, to give current viewpoints in the area, and to identify the regulatory requirements for their application and usage. The research topic was identified, primary sources were chosen and critically assessed, data were gathered, examined, and conclusions were developed as part of a systematic review that served as the foundation for this study. The present regulatory requirements for risk assessment in regard to exposure to chemical substances were assessed, together with the status of the pesticide market". Pesticide residues in food serve as a lens through which to view concerns related to food safety. They are pervasive in the natural environment owing to their extensive usage and remarkable durability, and their leftovers are harmful to both human and animal health as well as the ecosystem. Research has shown that the primary driver behind the hunt for novel instruments to manage agricultural diseases and pests is the increasing emergence of pesticide resistance in these populations. Therefore, in order to promote the growth of the natural goods industry, a variety of natural product alternatives to the phase-out of synthetic pesticides are being created. Natural phytotoxins have also been suggested for use as herbicides; however, using bioherbicides as models for synthetic herbicides is more successful. Additionally, they may be utilised to identify novel mechanisms of action and molecular targets for upcoming herbicides⁵.

An essay titled "Pesticides in agriculture and environment: Impacts on human health" sought to address issues surrounding pesticides, including kinds, environmental concerns, and health effects on humans. Because pesticides' "modes of action are not species-specific, concerns have been raised over the environmental harm associated with pesticide exposure in a variety of contexts (e.g., residues in food and drinking water). For the protection of crops, a variety of pesticides have been used for centuries. Pesticides benefit crops, but they can have a detrimental impact on the environment. Overuse of pesticides may be the cause of biodiversity loss". Hazardous pesticides pose a threat to the survival of many aquatic creatures and birds. Pesticides are recognised to be the primary cause of a number of illnesses, including cancer,

³ Debashri and Tamal, 2012

⁴ Khater, 2012

⁵ Barbaś P., Aslan H., Aslan I., Skiba D., Ademola Otekunrin O., Sawicka B., 2023

respiratory disorders, skin issues, endocrine disruption, and difficulties with reproduction. They may enter the human body by the mouth, inhalation, or skin⁶.

Statement of the Problem:

Because pesticides increase agricultural productivity and indirectly help society in several ways, they have proven to be a gift for agronomists and people worldwide. In any event, concerns over the risks that pesticides pose to the environment and human health have prompted inquiries into the safety of pesticides. Even though pesticides are designed to prevent, eliminate, or manage harmful insects, a number of studies have highlighted concerns about the harm that pesticides may do to the environment and to people's health. Therefore the problem stated is “**Pesticides – Its Problems and Prospects**”.

Significance of the Study:

Recently, pesticide-related concerns have received a lot of attention from interested parties in India and have been the subject of substantial coverage in the media, including scholarly publications. Synthetic pesticides have been used excessively and indiscriminately, harming agriculture and the environment as well as entering the food chain and having an impact on human health and development. The primary goal of the introduction of pesticides was to prevent and manage diseases and insect pests in field crops. Naturally, at first, the use of pesticides decreased pest activity and cleared the path for an anticipated increase in crop output. Concurrently, the augmented use of chemical pesticides has led to environmental pollution, with multifaceted long-term consequences for civilization. Given that the possibilities and issues associated with applying pesticides are the primary subject of this research, it is sufficiently noteworthy. It will be of great use to policy makers, users, and everyone else involved in this matter.

Objectives: The present article aims at the following-

- To study the prospects of Using Pesticides.
- To discuss the problems of using pesticides.

DISCUSSION:

Agro-chemicals use by stage of agriculture and cropping system

Farm Characteristics	Cropping System		
	Cereals (e.g., rice)	Other filed crops (e.g., cotton, tobacco)	Horticulture (e.g., fruits and vegetables)
Plenty of land for subsistence	Every chemical None	Every chemical Not too low.	Every chemical Not too low.
Scarce Land for Subsistence	Termiticides	Fungicides and insecticides	Fungicides
	minimal to moderate	Low to moderate	Low to moderate

⁶ “Vinod Kumar & Piyush Kumar,2019”

Plenty of land focused on the market	Marijuana Use: Moderate to High	Herbicides, fungicides Moderate to high	Fungicides, herbicides Moderate to high
Scarce Land, Market-driven	Insecticides, herbicides High	All chemicals High	All chemicals High

Source: Rola and Pingali (1993)

It is abundantly obvious that, in a farming system focused on the market, agrochemicals are utilized extensively for all crops. In subsistence farming situations, farmers often use less pesticide because they believe domestic output to be enough. Farmers always employ large amounts of agrochemicals to boost output intensity in order to become more market-oriented from a subsistence level and gain revenue. Another factor is that more chemicals, such as insecticides, are needed as land becomes scarce and agricultural production shifts towards a market-oriented approach (with limited acreage). Now that arable land is becoming a scarce and inelastic commodity as a result of population expansion, things will only become worse in the coming years, particularly in densely populated nations like China and India. It should be mentioned that the yearly pesticide market in India is anticipated to be around RS 5000 crores. This industry is expected to develop even quicker in the next years and soon dominate the global market⁷.

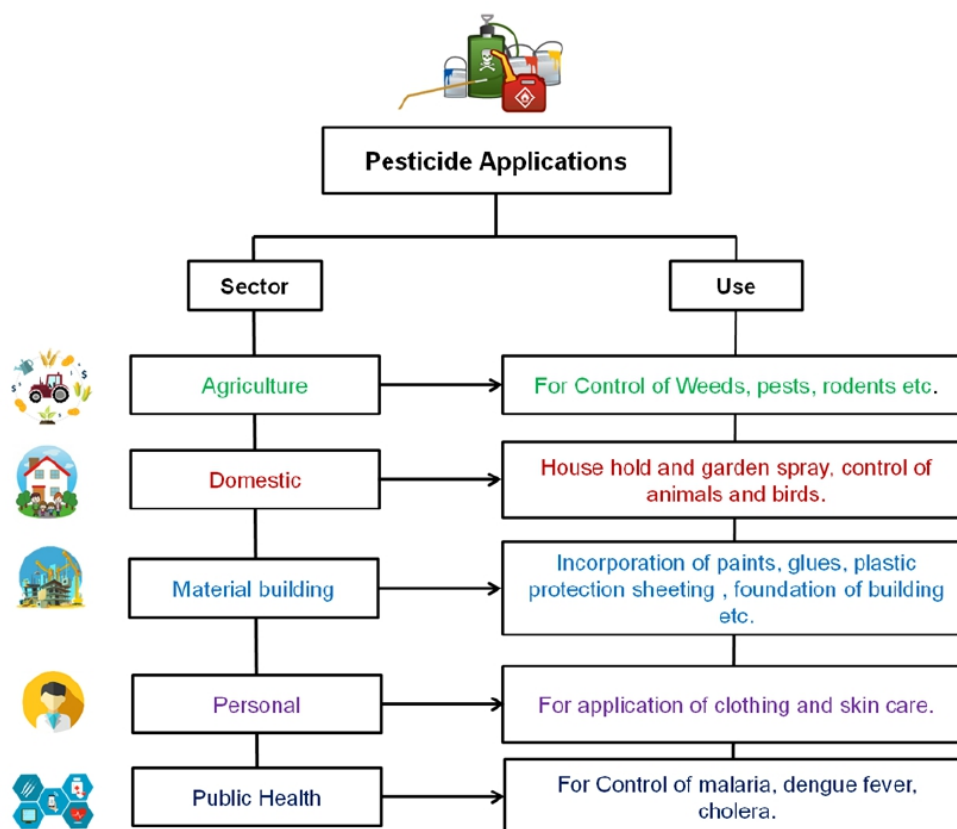


Fig: Applications of pesticides in various sectors⁸

Pesticides' effects on the environment:

⁷ Dr. S. Rajendran, 2003

⁸ Vinod Kumar and Piyush Kumar, 2019

Pesticides used on land endanger fish and other non-target organisms when they drift into aquatic systems. These chemicals interact with harmful algal blooms and other stresses in addition to being hazardous in and of themselves. There is evidence of a decline in the populations of some fish species due to pesticide misuse. There are three ways that toxic pesticides may come into contact with aquatic life⁹. *Dermally*: “Absorption via skin directly; *Breathing*: During breathing, uptake through gills” *Orally*: “Through drinking contaminated water. It is impossible to overlook the risks associated with the unchecked use of these toxins”. The effects of pesticides on populations of land and marine plants, animals, and birds must be carefully taken into account. The main concern is the build-up of chemicals in food chains, which directly affects raptors and predators. “In addition, insecticides may decrease the quantity of shrubs, weeds, and insects that serve as food for higher orders. The use of insecticides, herbicides, and fungicides has also been linked to declines in the population of rare animal and bird species. Aquatic plants provide around 80% of the dissolved oxygen, which is necessary for aquatic life to survive”. Herbicide-induced destruction of aquatic plants results in a sharp drop in O₂ levels, which ultimately depletes fish supplies and reduces fish output. Regardless, pesticides are able to seep underground via incorrect disposal, unforeseen spills and spillages, and surface water drainage from degraded areas¹⁰.

“A few soil organisms are engaged with the obsession of atmospheric nitrogen to nitrates. Chlorothalonil and dinitropheny fungicides have been appeared to disrupt nitrification and de-nitrification bacteria subordinate procedures”¹¹. Earthworms are important components of the soil ecosystem because they serve as both models for determining soil noxiousness and bio-indicators of soil pollution. Similarly, earthworms increase soil production. Earthworms are killed by pesticides, and the main way that the former is supplied to the latter is via contaminated soil pore water.

Health effects of pesticides on humans:

Research suggests that pesticides may be linked to a variety of diseases, such as asthma, cancer, and leukaemia. The potential health concerns resulting from pesticide exposure are contingent upon the toxicity of the ingredients and the extent of exposure. Furthermore, certain people may be more deeply affected by pesticides than others—children, expectant mothers, or ageing populations, for example. Exposure of humans, whether deliberate or by diet, may have severe and delayed effects on health. According to WHO estimates, over 500,000 people in the western Pacific and south-east Asia died as a result of self-poisoning in 2000 alone (WHO, 2001). The evaluated annual frequency rate for agricultural labourers in developing nations was found to be 7.4 per million younger pupils and 18.2 per 100,000 full-time employees¹².

“In India, harming because of pesticides was first informed in 1958 in Kerala where over in excess of 100 individuals expired after feeding on parathion polluted wheat flour”¹³. In the long run, pesticides may cause birth abnormalities, reproductive issues, immune system disturbance, lymphomas, leukaemia, soft tissue sarcomas, cancerous growths in the mind, bone, and stomach, damage to the peripheral and central nervous systems, and even death¹⁴.

Conclusion:

⁹ Helfrich *et al.* 2009

¹⁰ Pesticides in Groundwater, 2014

¹¹ Lang and Cai, 2009

¹² Bolognesi and Merlo, 2011

¹³ Karunakaran, 1958

¹⁴ Michael *et al.*, 2013

In addition to advocating for state-funded pesticide education, “There is a need for greater emphasis on research, item improvement, product testing and registration, and the implementation of pesticide utilization strategies by the public and private sectors, including government agencies, non-governmental organizations, and pesticide manufacturers”. Now more than ever, the optimal use of pesticides is needed to protect our environment and any health risks associated with it. In order to reduce the overuse of pesticides, it is important to support organic farming methods and look for biological pesticides or organisms that can manage agricultural pests instead of using synthetic pesticides.

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