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Impact of Pesticides on Environmental and Human Health

A Review Paper

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Abstract

The industrialization of the agricultural sector has increased the chemical burden on natural ecosystems. Pesticides are agrochemicals used in agricultural lands, public health programs, and urban green areas in order to protect plants and humans from various diseases. However, due to their known ability to cause a large number of negative health and environmental effects, their side effects can be an important environmental health risk factor. The urgent need for a more sustainable and ecological approach has produced many innovative ideas, among them agriculture reforms and food production implementing sustainable practice evolving to food sovereignty. It is more obvious than ever that the society needs the implementation of a new agricultural concept regarding food production, which is safer for man and the environment.

Many pesticides can also pose risks to people. Generally, however, people are likely to be exposed to only very small amounts of a pesticides – too small to pose a risk.

Keywords:- pesticides, agrochemicals, environmental health, endocrine disruptors

Introduction

Pesticides are substances or mixtures of substances that are mainly used in agriculture or in public health protection programs in order to protect plants from pests, weeds or diseases, and humans from vector-borne diseases, such as malaria, dengue fever, and schistosomiasis. Insecticides, fungicides, herbicides, rodenticides, and plant growth regulators are typical examples (1–3). These products are also used for other purposes, such as the improvement and maintenance of non-agricultural areas like public urban green areas and sport fields (4, 5). Furthermore, there are other less known applications of these chemical substances, such as in pet shampoos (4), building materials, and boat bottoms in order to eliminate or prevent the presence of unwanted species (6).

Pesticides are chemical compositions employed to eliminate fungal or animal pests. Nonetheless, an average of 95% reaches other organisms apart from the targeted pests, because of their application technique in the farming fields. For instance, overflow can take pesticides into water bodies, while the breeze can take them to other areas such as human settlements and grazing regions, probably affecting other animals.

More challenges arise such as poor production, storage, and transport practices. Repeatedly spraying also enhances the pest resistance and resurgence while still affecting the other organisms in the soil. [7]

Impacts of pesticides on the environment

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Pesticides are toxic chemicals designed to be deliberately released into the environment. Although each pesticide is meant to kill a certain pest, a very large percentage of pesticides reach a destination other than their target. Pesticides easily contaminate the air, ground and water when they run off from fields, escape storage tanks, are not discarded properly, and especially when they are sprayed aerially.[8]

- Water

Pesticides can be found in rain, ground water, streams, rivers, lakes and oceans. There are four major ways that pesticides can reach the water:

- it can drift outside of the area of where it was sprayed,
- it can leach through the soil,
- it can be carried as runoff,
- Or it may be spilled accidentally.
- Soil

The use of pesticides decreases the general biodiversity in the soil. Soil quality is higher without chemicals and this allows for higher water retention, necessary for plants to grow.

- Plants

Nitrogen fixation, which is necessary for the growth of many large plants, is hindered by pesticides that can be found in soil. This can lead to a large decline in crop yields. Application of pesticides to crops that are in bloom can kill honeybees, which act as pollinators. This also decreases crop pollination and reproduction.

- Animals

Animals may be poisoned by pesticide residues that remain on food after spraying. An application of pesticides in an area can eliminate food sources that certain types of animals need, causing the animals to relocate, change their diet, or starve. Poisoning from pesticides can even make its way up the food chain; for example, birds can be harmed when they eat insects and worms that have consumed pesticides.

- Aquatic Life

Fish and other aquatic biota may be harmed by pesticide-contaminated water. Application of herbicides to bodies of water can cause plants to die, diminishing the water's oxygen and suffocating the fish. Repeated exposure of some pesticides can cause physiological and behavioural changes in fish that reduce populations, such as abandonment of nests, decreased immunity to disease, and increased failure to avoid predators.

PESTICIDE ALTERNATIVES | ORGANIC FARMING

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Pesticides might improve crop yield and productivity, but they can also deteriorate the environment in the long-term—contaminating ground water, soil and its fertility, and even the air. They can harm other beneficial soil organisms, insects and plants, and can be toxic to animals (like fish and birds) [9].

Here are 3 agricultural alternatives that can keep crops pest-free without conventional pesticides:

1. BIOCONTROL (AKA: BIOLOGICAL CONTROL)

It's not as scary as it sounds—think of bio in terms of biology, and control as in maintenance. Essentially, bio control is using a pest's natural enemy (like a specific insect or bacterial strain) to fend off the pests. Extensive research is conducted to ensure that these natural enemies don't inflict unintended damage to the native vegetation or other insects, only targeting the specific pests eating away at crops.

But bio control is not a modern invention. In fact, it was first reportedly used in ancient China around 304 C.E., in which citrus fruits were protected by ants from other insects! Today, other organisms are also being used, like microscopic worms (aka: nematodes).

2. POLYCULTURE (COMPANION PLANTING)

Think of poly in terms of many, and culture in terms of growth (like crop growth in agriculture). Essentially, it means planting multiple types of crops in the same field rather than just one specific type. Within polyculture, there is a concept called 'companion planting'. It's just as it sounds: you plant partner-plants together with crops as a means to support the crop.

From a pest-control lens, it's ideal to plant plants that naturally repel specific pests of your crop. For example, if you plant tomatoes with cabbage, the tomatoes naturally repel diamond-backed moth larvae that eat cabbage. Or, basil with tomato can fend of flies and mosquitoes.

Conclusion-

The need for protection against pests is a given and has its roots in antiquity, when both organic and chemical substances were applied as pesticides. Since then, numerous chemical pesticides have been produced, and now multinational agrochemical companies, which mostly control global food production, apply new chemical substances with pesticide properties and implement biotechnological advances, thus diverging from traditional agricultural methods. Furthermore, current agricultural practices are based on the wide use of chemical pesticides that have been associated with negative impacts on human health, wildlife, and natural environment [10, 11, 12, 13, and 14]

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