JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

# A REVIEW OF DIFFERENT PESTICIDES AND THEIR USEFULNESS

**Jatindra Kumar Mishra**

(Reader in zoology)

**DKN COLLEGE, ERANCH ,CUTTACK**

## ABSTRACT

Humans are constantly engaged in wars with other organisms and ailments. Using pesticides is one method for gaining an advantage in many of these ecological interactions. These substances are used to protect crops from undesirable numerous "weeds," as well as to protect crop plants, cattle, domestic animals, and people from harm and sickness caused by bacteria, fungus, insects, rodents, and other "pests."

Microbial pesticides are microorganisms (such as bacteria, fungi, protozoan's and viruses) that are used to control a wide variety of agricultural pests, such as plant disease-causing microbes, fungus, insects, and weeds. The goal of this topic is to promote a more efficient regulatory process for microbial pesticide products and their utility.

The goal of this work is to consolidate and provide several methodologies for assessing pesticide toxicity in organisms associated to the agro ecosystem, as well as suggestions on various pesticides and their usage.

(**Key words:** Pesticides and Their Properties, pesticides and human health. Pesticides in forestry. Pesticides in agriculture. Pesticides in homes and gardens.)

## 1. INTRODUCTION:

In discussions regarding pesticides, organic agriculture, conventional farming, and backyard gardening, questions about which pesticides can be used, where pesticides come from, and the risks to people, pollinators, and the environment are frequently raised. Terms like "synthetic," "toxicity," "natural," "organic," and "chemicals" can be used interchangeably. The purpose of this information sheet is to provide an overview of these and other words related to pesticides in organic and conventional crop farming.

Pesticides are designed to have the greatest possible target action. Pesticides are available that are specifically designed to kill bacteria, fungi, nematodes, insects, and acarines. These pesticides are target specific up to certain concentrations and for specified periods of exposure (Sterk et al., 2001). When pesticides interact with non-target organisms, unfavourable effects occur at larger concentrations and for longer periods of exposure. This is true for both chemical and microbiological insecticides (George and Ambrose, 1999). When non-target creatures are beneficial components of the ecosystem, the effect is ecologically negative (Sahayaraj, 2001). Natural enemies and predators regulate pest population in the majority of natural environments (Lenteren et al., 2003). When pesticides are administered indiscriminately, they are likely to impact both target and non-target organisms (Kuske et al. 2004).

Binar pesticide combinations have been employed in situations when non-target toxicity has been noted. The non-target insecticides in the binary combination made the following binary system component more harmful to each other. The co-toxicity co-efficiency (cTc) of the majority of binary mixes of pesticides revealed blatant non-target synergism (Christian et al., 1986; Rahman and Wilkins, 2001; YiLiang et al., 2002).

Pesticides can either be applied topically or combined with food. Pesticides produced by microorganisms might be found as powders, solutions, or broth. The plants in the agroecosystem are covered in microbial pesticides. The 29 pests' bodies develop microbial spores when they come in contact with them. The many parts of the body give the bacteria places to anchor.

## 2. REVIEW OF LITERATURE:

Pesticides are substances, either natural or manufactured, that are used to contro of pests like weeds, rodents, insects, and fungi. Long-term toxicity chronic toxicity is a hazardous reaction that takes place after exposure to a pesticide. Because of the possibility for exposure to pesticides in food products, water, and the air, the general public as well as individuals who deal directly with pesticides are concerned about the chronic toxicity of pesticides.

Sudarwohadi and Said (1977) compared the efficacy of Thuricide HP a Bt preparation with a standard organophosphorus compound, quinalphos in the management of diamond back moth on cabbage. Barjac (1978) identified the presence of highly toxic B. thuringiensis israelensis, serotype H14 in the mosquitoes. Ferron (1978) suggested entomopathogenic fungi as excellent candidates for biopesticides. Griego and Spence, (1978); Sorenson and Falcon (1980); and Beegle et at. (1981) suggested of Bt insecticides since they exhibit poor stability under field conditions McLeod etal ,(1978)andSmits et a!, (1987) described the drawbacks-assoçiated with the.use ofarthropod- ' . specific viruses in agriculture. l, Mohamed et al. (1979) aIialyed-Lthe synergistic action of thiricide along with théceibaL pesticides on diamond back moth, Plutella xylostella.

The combined effect of sunlight, leaf temperature and vapour pressure deficit contribute more to the Reduction in the b'ioactivity of Bt due to changes in certain environmental factors was analysed by Leong et at. (1980). The presence of free chlorine in water inhibited or destroyed the endotoxin Sinegre el at., (198 1). Ihe impact of microbial toxins on non-lepidopteran 4 non-target organisms. isdëscribed by Krieg and Langenbruch (1981); MacIntosh et . at. (1990);Meliñ and Cozzi (1990), Sims (1995) and Sims (1997), Wraight et at T(1981) suggested that increasing age of the larvae result6d"in reduced susceptibility to Bt in mosquito and black flies. Control of black flies (Austrosimulium laticorne and A. multicorne) by using Bt k in New Zealand was shown to be feasible by Chilcott el at. (1983)

Frankenhuyzen (1993) suggested that there have been successful applications of B. thuringiensis based in'seëticidesfor. over. forty 'pest species in the world. In B. sphaericus, pathogenièity appears to be due to toxins released from both vegetative cells and , paraspbral crystals as reported by Tanada and Kaya (1993). Tanada and Kaya (1993) reported that Lagenidium giganteum is an oomycete fungus which is pathogenic . to a number of mosquitoes including Aedes, Culex and Anopheles

Marrone and Macintosh (1993) observed that the gut of insects infected with Bt becomes paralysed. The insect stops feeding and most insects will die within a few hours of ingestion. Meadows (1993) reported about toxins liberated by Bt in the insect gut. The lack of resistance development to Bt on host populations due to synergistic 18 4. interaction involving four proteins was anal y zed by Becker and Margalit" (l993)Y

Lacey et al. (1999) investigated that five weekly applications of low and high label rates of agenetically engineered isolate of Bi'fr. •control of 'Leptinotarsa decemlineata, resulted in far control of the beetle with no detectable effects on non-target organisms including predatory Ilemiptera. Hajek and Goettel (2000) suggested broad guidelines for the evaluation of the effects of microbial control agent on non-target organisms. Romeis et al. (2003) showed that larvae of the green lacewing predator Chrysoperla carnea are negatively affected when preying on lepidopteran larvae that had been fed with transgenic maize expressing the cryinb it gene from B. Ihuringiensis. Side effects of selected biopesticides of reduviid predator Rhynocoris marginatus (Fab.) was studied by Sahayaraj et al. (2003).

**3. OBJECTIVE OF THE STUDY**:

- To explain the terms "pest" and "weed," and to offer justifications for why it might be necessary to lessen their prevalence.
- To study the pesticides and their properties.
- To study the use of pesticides and human health. the use of pesticides in forestry. Use of pesticides in agriculture. Use of pesticides in homes and gardens.
- To study the conclusion of pesticides and their usefulness.

## 4. METHODOLOGY:

The secondary data have been used for this study's objective. The secondary information was gathered from books, records of printed manuscripts, official publications, journals, files, and various booklets relating to the issue.

## 5. ANALYSIS AND INTERPOLATION:

A pest is an organism that is harmful to crops, cattle, food, or human health. Pests including insects, weeds,and others that cause diseases, for example, can be found in backyard gardens and crop production systems (NPIC, 2018b). According to federal law in the United States, a pesticide is a substance that "is intended for preventing, destroying, repelling, or mitigating any pest" (NPIC, 2018a). Insecticides, herbicides, fungicides, disinfectants, repellents, and biopesticides are all examples of pesticides. A pesticide's toxicity is its ability to harm living systems. Toxicity is defined by the chemical composition of a material and quality is being poisonous. Pesticides can have acute effects during a short period of time, or chronic impacts over a longer period of time from repeated exposures at lower levels.

Pesticides are most effective when used in conjunction with an integrated pest management (IPM) plan that incorporates a variety of methods, such as routine pest reconnaissance and the use of physical barriers such as netting. IPM employs strategies that take into account the biology and behaviour of the pest, the host plants, and the environmental situation. Plants that are planted in good soil, receive adequate water, and are surrounded by a diversity of beneficial insects are more likely to be healthier and thus more capable of withstanding modest pest stress (NPIC, 2018b).

The Environmental Protection Agency's (EPA) objective is to preserve human health and the environment through the development and enforcement of rules, the provision of funds, the study of environmental issues, the sponsorship of partnerships, the publication of information, and the education of the public. The Environmental Protection Agency (EPA) was founded in 1970 to integrate government research, undertake programme monitoring, and establish standards and enforce environmental protection. The EPA reviews and registers all pesticides before they are sold or distributed in the United States. Each state government, in addition to the federal process, has its own approval process for new pesticide products. A product that has been approved by the EPA must also be registered with the state.

A chemical is a fundamental substance that is used in or created by a reaction that involves atom and molecule modifications (Cambridge). Chemicals make up all matter, including the human body, plants, water, and air. The phrase "chemical" is a broad term that is frequently used to refer to a very dangerous material. This usage of the term can be ambiguous and perplexing, as certain substances are really toxic and destructive, while many others pose no risk and are necessary for life.

### 5.1. TYPES OF PESTICIDES:

- **Synthetic pesticides** are substances that are created by people using a commercial procedure. Some are only offered to licenced applicators, while others are commercially available to gardeners through retail garden stores.

- **Synthetic pesticides** known as conventional pesticides are frequently employed in traditional agriculture. Biopesticides and antimicrobial pesticides are not typically included in traditional active ingredients because they are typically created synthetically.
- **Naturally occurring pesticides:**Natural substances created by nature, such as diatomaceous earth and biological control agents, are the source of naturally occurring pesticides. To put it another way, natural insecticides are not manufactured. They tend to degrade quickly in the environment, which lowers the potential of harm to creatures that aren't the target, although pest control may require repeated treatments. Pesticides that are produced naturally typically have lower potency than pesticides that are made synthetically..
- **Pesticides permitted in certified organic production** are certain pesticides that have been approved for use in organic agriculture according to the U.S. Department of Agriculture (USDA). While most of these pesticides are naturally occurring, several approved synthetic materials are available for use under particular circumstances. The USDA compiles the National List of approved and prohibited substances that may be used in organic production. The Organic Materials Review Institute (OMRI) publishes a list of products allowed for use under the USDA National Organic Program. This list is publicly accessible online. An important principle of certified organic production is to attempt to manage pests by alternative means before using approved pesticides.
- **Reduced risk pesticides** decreased risk insecticides are common insecticides that producers who seek to reduce dangers to human and environmental health may find useful. Benefits include reduced groundwater pollution risk, reduced toxicity to non-target organisms like birds and fish, reduced human health effects, and reduced potential for pesticide resistance development. The EPA can expedite the assessment and regulatory decision-making process for conventional pesticides with a relatively low risk of harm to humans and the environment after a federally appointed panel determines that a pesticide merits reduced risk designation.

The EPA found that minimal risk pesticides provide little to no damage to the environment or to human health, hence federal pesticide registration is not necessary. All other pesticides must be registered with the federal government. However, Ohio does need state registration for low-risk items. It depends on the pesticide's active and inert components whether it may be categorised as low risk. Examples of the active components used in low risk insecticides include plant essential oils and maize gluten meal.

### 5.2. PESTICIDES AND THEIR PROPERTIES

Pesticides are defined by their ability to kill or reduce the abundance of species considered to be "pests." Pesticides, on the other hand, are a very diverse category of compounds. It is useful to categorise them in many ways to better comprehend their utility and toxicity, as well as the damage they produce. One classification is based on the intended audience:

- Fungicides are used to combat fungi that harm crops, animals, and other living things.
- Weeds are undesired plants that obstruct human endeavours. Herbicides are employed to eradicate them; most commonly, they are used in agriculture and forestry to free crop plants from competition, while they are mostly utilised in horticulture for aesthetic purposes.
- Insecticides are used to eradicate insects that are pests in horticulture, forestry, and agriculture as well as those that transfer diseases like malaria, yellow fever, and encephalitis through mosquitoes, among others.
- A rodenticide is used to manage mice, rats, gophers, and other rodents that are pests in agriculture or around the home.
- Nematicides are used to combat nematodes, which can harm the roots of agricultural plants.
- Avicides are used to kill birds, which are occasionally viewed as pests in agriculture.
- Piscicides are used to kill fish, which may be pests in aquaculture. Algicides are used to eradicate unwanted algae growths, such as in
- Antibiotics, bactericides, and disinfectants are used to treat infections and ailments brought on by bacteria (note that the Pest Control Products Act does not legally classify antibiotics as "pesticides").

## 5.3.USE OF PESTICIDES AND HUMAN HEALTH:

Numerous insects and ticks act as carriers of infections that can spread between members of the same species, to humans, domestic animals, or other animals. Included among the significant human diseases carried by invertebrates are the following:

- Malaria, which is transmitted by Anopheles mosquitoes and brought on by the protozoan Plasmodium.
- Viral diseases carried by mosquitoes, such as West Nile virus, encephalitis, and yellow fever

- sleeping sickness, which is carried by the tsetse fly Glossina and caused by the protozoan Trypanosoma
- Yersinia pestis, a bacterium that causes plague or the "black death," which is spread by the rat flea the Xenopsylla cheops
- Typhoid, which is spread by the louse and caused by the bacterium salmonella typhi
- Human Pediculus Schistosomiasis or bilharziasis, which is brought on by the blood fluke Schistosoma and is also spread by freshwater snails

The occurrence of these illnesses can be reduced to varied degrees by utilising pesticides against invertebrate vectors or other hosts. Mosquito populations can be decreased, for example, by spraying pesticide in their aquatic breeding habitat or by applying a persistent insecticide to the inner walls of houses where they rest. Similarly, people plagued with body lice may be given a surface dusting of a pesticide - an early use of DDT.

To manage the plague, use rodenticides in conjunction with cleanliness programmes to lower rat populations. Pesticides have reduced the abundance of vectors and alternate hosts over the last half-century, saving hundreds of millions of people from the debilitating or fatal impacts of some diseases, particularly in tropical nations. This has played a major role in lowering death rates and allowing for fast population increase.

During the Second World War, one of the first significant uses of DDT was in Naples, Italy, to avoid a devastating typhus pandemic that might have destroyed Allied forces and the civilian population. Because of the success of this application of DDT and its contribution to the winning war effort, Winston Churchill, the British prime minister at the time, referred to the insecticide as "that miraculous DDT powder."

## 5.4. AGRICULTURE AND PESTICIDES:

Agriculture today is a highly technological endeavour. Machines, energy, fertiliser, pesticides, and high-yield crop types are utilised in intensive management methods to raise crops (see Chapters 14 and 24). Pesticides play a role in reducing the prevalence of the following problems:

Microbiological diseases that can destroy the crop or decrease its output,Worms that compete with crop plants, such as those that devour insects and rodents that eat crops or stored produce.

These pesticide applications unquestionably play a significant role in contemporary agriculture. Even with the widespread use of pesticides, the harm done by pests and diseases amounts to around 24% of the potential wheat, 46% of the potential rice, 35% of the potential corn (maize), 55% of the potential sugar cane, 37% of the potential grapes, and 28% of the potential vegetable crop (McEwen and Stephenson, 1979). Pests in North America eliminate 37% of the capacity for growing food and fibre crops (Pimentel et al., 1992).

Agriculture management techniques have undoubtedly become much more sophisticated, especially during the past century. Crop productivity has increased as a result of this modification. The combined influences of the following have greatly contributed to the increases in agricultural yield.

Utilising fertiliser, pesticides, fossil-fueled machinery, enhanced crop varieties cultivated in monocultures, and the use of these practises

The "green revolution" is a term that has been used to describe the recent intensification of agrotechnology. Despite the fact that agricultural yields have improved significantly, it is important to note that the following (also read Chapters 14 and 24) significantly subsidise the gains:

Extensive salinization of soils in semi-arid regions (caused by improper irrigation methods); intensive use (and depletion) of non-renewable fossil fuels and metals; depletion of potentially renewable resources, such as soil fertility and tilth, as well as groundwater and surface water needed for irrigation; loss of soil mass through erosion; ecological harm associated with the conversion of natural ecosystems into agricultural ones; and ecotoxicological harm.

## 5.5. FORESTRY PESTICIDES:

When compared to the use of the same chemicals in agriculture, the use of pesticides in forestry frequently sparks greater debate. Compared to largely foreign species in agriculture, the many native species exposed to forestry sprays may suffer harm, which is an element of the controversy. In addition, whereas spraying in agriculture frequently includes individual farmers operating a family farm, spraying in forestry is typically carried out by government agencies and major businesses. People's attitudes about the usage of pesticides can be influenced by the fact that they generally have more empathy for individuals than for powerful institutions or corporations.

In forestry, pesticides are primarily employed to manage weeds in reforested regions and plantations and to combat epidemics of defoliating insects. In New Brunswick, where a cumulative area of roughly 49 million hectares was sprayed between 1952 and 1992 (this is investigated subsequently as a case study), the largest insecticide spraying campaigns against the spruce budworm (Choristoneura fumiferana) have been conducted. Other significant spraying campaigns have targeted the hemlock looper (Lambdina fiscellaria), gipsy moth (Lymantria dispar), and bark beetles (particularly species of Ambrosia and Ips). The gipsy moth is an invasive pest that defoliates numerous tree species.

## 5.6. HOME AND GARDEN USE OF PESTICIDES:

Pesticides are frequently used in and near residences. For instance, pesticide can be used to get rid of bedbugs and cockroaches, and rodenticide can be used to get rid of rats and mice. In addition, horticulture makes extensive use of pesticides. Herbicides are very often used, mostly to create the grass-lawn look that many homeowners desire. Herbicide is thus employed to eradicate broad-leaved plants like plantains and dandelion. The herbicide 2,4-D, dicamba, or mecoprop is the "weed" in popular "weed-and-feed" lawn mixtures.

Golf course maintenance uses some of the most pesticides, especially on the putting greens where the lawn quality needs to be highly constant. To prevent turf-grass infections, fungicide is employed at very high concentrations. The use of pesticides on putting greens can be more intensive than practically any other in agriculture, measured in terms of per-unit area.

## 6. CONCLUSIONS:

Pesticides are a diverse group of chemicals that are employed in horticulture, forestry, and agriculture to gain the upper hand over species that spread disease or are pests. However, there is a chance that employing many pesticides will harm the environment or people's health.

There are currently no suitable alternatives for all of the ways in which pesticides are used in the intensive systems used to grow most foods and other crops. The usage of insecticides will therefore continue for the foreseeable future. However, additional study is needed to identify practical strategies for lowering reliance on pesticides, particularly on integrated pest management techniques and biological control strategies. The use of pesticides should be minimised for the time being, and the most hazardous substances should no longer be used legally.

## 7.REFERENCE:

Algimantas Mieldazys, Ramunas Mieldyzys, Gedimanas Vilkevicius, Aleksandaras; Agriculture use of pesticides/ plant protection products, Forestry operations and OSH issues OSHWiki. [Cited on 2018 April 24]. Available from https://oshwiki.eu./wiki/Agriculture__

Krishan Vij; Agrochemical poisoning, Textbook of Forensic Medicine and Toxicology, 3rd edition, Reed Elsevier India Private limited; 2005. p. 734-749.

World Health Organization; Pesticides: Children Health and the Environment 2008. [Cited on 2018 April 7]; available from: http://www.who.int.ceh/pesticides.pdf .

FAO- Food and Agricultural Organization of United Nations, Internal code of conduct on the distribution and use of pesticides, Rome 2002 p.36. [Cited on 2018 April 7] available from http://www.fao.org/docrep/005/ y5544e/y4544e00htm .

Overview of Ecological Risk Assessment process in the office of pesticides programme, U.S. Environmental Protection Agency, Endangered & Threatened species Effect Determination. Office of pesticide programmes, Washington D.C. Jan, 2004. [Cited on 2018 April 8].

Pesticide Management division, NIPHM; Pesticide classification on use, chemical nature, formulation toxicity and action, etc, Hyderabad p.1-17 [Cited on 2018 May 5] available from http://www.niphm.gov.in.

Algimantas Mieldazys, Ramunas Mieldyzys, Gedimanas Vilkevicius, Aleksandaras; Agriculture use of pesticides/ plant protection products, Forestry operations and OSH issues OSHWiki. [Cited on 2018 April 24]. Available from https://oshwiki.eu./wiki/Agriculture.

WHO- World Health Organization, the WHO recommended classification of pesticides by hazard and guidelines to classification: 2009.2010 [cited on 2018 may 6] available from http://www.who.int/ipcs/publications/pesticides_2009.pdf .

WHO- World Health Organization, the WHO recommended classification of pesticides by hazard and guidelines to classification: 2009.2010 [cited on 2018 may 6] available from http://www.who.int/ipcs/publications/pesticides _2009.pdf.

Pesticide Management division, NIPHM, syllabus, Pesticide classification on use, chemical nature, formulation toxicity and action etc., Hyderabad p.1-17 [Cited on 2018 May 5] available from http://www.niphm.gov.in.

I.C. Yadav, N.L. Devi; pesticides classification and its impact on Human and environment environ.sci &engg.vol 6: Toxicology 2017 p.140-158. 12. Pesticide Management division, NIPHM, syllabus, Pesticide classification on use, chemical nature, formulation toxicity and action etc, Hyderabad p.1-17, [Cited on 2018 May 5] available from http://www.niphm.gov.in./ASO.PMD.pdf