

To identify the major challenges faced by the agricultural chemistry-based industry in Uttar Pradesh due to the use of pesticides

Subhash Chand¹, Dr. Ram Singh Godara²

Research Scholar¹, Associate Professor²

School of Agriculture

Glocal University, Mrizapur Pole, Saharanpur, Uttar Pradesh

ABSTRACT

We live in a globalized world, which means that the production, trade, and consumption of agricultural crops and other goods and services for which significant quantities of pesticides and fertilizers are used are shaped not only by the needs and demands of a growing population but also by the megatrends that are associated with that population growth, such as urbanization and the growth of the **Uttar Pradesh**. The use of synthetic pesticides, which have an impact on agricultural systems, is common practice for weed and insect pest management. It is vital to note that water, soil, and air all have a role as mediums in the movement of pesticides from one location to another. According to the findings of the study, farmers have a reasonable level of awareness regarding the dangers that pesticides pose to both the environment and human health. Therefore, organizations like the International Association of Dryland Agriculture (IADA), the Department of Agriculture (DA), and the government should take steps to increase paddy farmer understanding of the risk and hazard presented by pesticides that are both forbidden and not prohibited. Toxic chemical compounds or a combination of substances that are purposefully introduced into the environment to prevent, discourage, control, and/or kill and destroy species of insects, undesired plants, rodents, fungi, or other dangerous pests are known as pesticides. Pesticides can also be used in combination with other substances. Insects and other pests that feed on crops can be killed or made more harmful by the application of pesticides. Since the beginning of agriculture, farmers have relied on a wide variety of insecticides to safeguard their crops.

KEYWORDS: Effect, Pesticides, Agriculture, Chemistry, Industry, Environment

INTRODUCTION:

The problems of Uttar Pradesh that are associated with pesticides have been brought up more frequently and to a greater extent in the public discourse, including in academic publications, and have captured the attention of decision-makers in India as well as in other countries. The careless and excessive use of hazardous synthetic pesticides has

not only caused damage to the environment and the agricultural sector, but these chemicals have also made their way into the food chain, which has an effect on every living thing. The findings of the current study on the presence of pesticide particles in packaged water are typical examples that illustrate the nature and scope of the problem. In the middle of the 1960s, along with other inputs for the development of the green revolution package in Indian agriculture, pesticides, herbicides, and fungicides were made available on a large scale for the first time. Naturally, at first, the use of pesticides decreased the number of pest attacks and prepared the path for an increase in crop output, as was anticipated. The primary goal of the introduction of pesticides was to prevent and control insect pests and illnesses that could be transmitted to field crops. Concurrently, a surge in the use of chemical pesticides has led to the contamination of the environment, and researchers have discovered that this contamination has a number of negative long-term effects on society. Whether they are aware of it or not, Indian farmers have developed an addiction to the careless and excessive use of agrochemicals, which is making an already difficult situation far more difficult not only in India but also in other areas of the world (Conway, 1984).

Environmental and Health Impacts

The contemporary era is characterized by globalization, wherein the production, trade, and consumption of agricultural crops and various commodities and services necessitate the substantial use of pesticides and fertilizers. These practices are influenced by the requirements and desires of a burgeoning population, as well as the accompanying megatrends (*such as urbanization and the growth of the global middle class, for example*) (UNEP 2019). The projected trend suggests that there will be a sustained increase in the worldwide demand for, production of, and utilization of pesticides and fertilizers (Oliver, 2018; Food and Agriculture Organization of the United Nations [FAO], 2021a; International Fertilizer Association [IFA], 2021a). This phenomenon has been noted over the course of the previous few decades. In contrast to the prevailing majority of industrial chemicals, insecticides and fertilizers, whether inorganic or organic in nature, are intentionally released into the environment with the aim of carrying out targeted functions. As a consequence of these circumstances, there exists a plausible risk to both the natural ecosystem and human well-being.

The negative effects that pesticides and fertilizers have on both the environment and human health have been the subject of a plethora of research and reports, with pesticides being a more publicly accessible source of knowledge. The fact that pesticides are deliberately formulated to have a high level of toxicity contributes, at least in part, to

the devastation that they cause. According to the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) (2014, these substances, despite their intention to eradicate undesirable insects, plants, and other forms of life, may instead have a harmful effect on creatures that are not their intended targets. When it comes to fertilizers, the majority of unfavorable consequences are caused by their release into the environment and the effects they have on ecosystems. These effects are generally the result of nutrient loss, which can be caused by either excessive use or inefficient use of the product (Kopittke et al. 2019).

Harmful effect of pesticides

Toxic chemical compounds or a combination of substances that are purposefully introduced into the environment to prevent, discourage, control, and/or kill and destroy species of insects, undesired plants, rodents, fungi, or other dangerous pests are known as pesticides. Pesticides can also be used in combination with other substances. Insects and other pests that feed on crops can be killed or made more harmful by the application of pesticides. According to Mahmood et al. (2015), farmers have been protecting their crops with a variety of pesticides for hundreds of years. Pesticides can be created synthetically or they can be made from naturally occurring chemicals. They could be classified under any one of the several categories of pesticides. According to Mahmood et al. (2015), the groups of pesticides known as organ chlorines, carbonates, organophosphates, pyrethroids, and neonicotinoids make up the majority of those that are used commercially. In order to protect crops from a wide range of destructive organisms, pesticides are a common and widespread tool in agricultural production (Osman et al., 2008).

REVIEW OF LITERATURE

Abhilash, P.C. and Singh, N. (2009) explored acceptance by producers of suboptimal agricultural practices, resulting in decreased productivity and sustainability. Numerous human activities, frequently characterized by the excessive use of pesticides based on the belief that "increased quantity yields better results," as well as the premature harvesting of crops without adequate waiting periods, have resulted in significant ecological degradation. This observation has led to the recognition that India is the most prolific producer of pesticides in Asia and the thirteenth most prolific consumer of pesticides worldwide. Andhra Pradesh is one of the three Indian states with the highest pesticide procurement rates, along with Uttar Pradesh and Punjab.

The report authored by Gomes (2023) Agricultural chemicals, commonly known as pesticides, are being widely employed as cost-effective strategies to mitigate the

negative impact of insects and weeds on crop production. The objective of this endeavor is to address the sustenance needs of the global population and ensure consistent and secure food provision both presently and in the forthcoming years. Pesticides can be broadly classified into three main categories: insecticides, fungicides, and herbicides. Insecticides are designed to eradicate harmful insects and may incorporate insect growth regulators. Fungicides, on the other hand, aim to prevent and eliminate fungi, such as powdery mildew, that can adversely impact plant growth. Plant growth regulators are often included in fungicides. Lastly, herbicides are intended to impede the growth of weeds and also encompass plant growth regulators. Each of these pesticide groups exhibits a higher level of efficacy against organisms that pose a threat to agricultural crops.

Tanveer, M., Sharma, A., Kumar, V., Shahzad, B., Sidhu, G. P. S., Handa, N., Sharma, A., Kumar, V., and Thukral, A. K. (2019) conducted an investigation. The use of synthetic pesticides, which have an impact on agricultural systems, is common practice for weed and insect pest management. It is vital to note that water, soil, and air all have a role as mediums in the movement of pesticides from one location to another. Organochloride pesticides are the most hazardous type of pesticide because they decompose at a more gradual rate, are more stable, and have a longer half-life. These pesticides have the potential to move up the food chain and accumulate at higher trophic levels as they do so. The pollution of any environment by pesticides is a significant concern that is detrimental to any organisms that are involved with that ecosystem. Therefore, in order to manage pesticide usage, new procedures and techniques are required in assessing the effect of widespread use of pesticides on ecosystems, and efforts should be made to promote awareness among the general public in order to minimize the application of dangerous pesticides. It is strongly recommended that chemical pesticides be avoided in favor of the use of biopesticides.

Sabran-Abas (2021) investigated the findings of the study and came to the conclusion that the levels of awareness among farmers regarding the dangers of pesticides on human and environmental health were modest. Therefore, organizations like the International Association of Dryland Agriculture (IADA), the Department of Agriculture (DA), and the government should take measures to educate paddy farmers about the risk and danger caused by pesticides that are both illegal and not prohibited. The current framework has to be enhanced by means of educational programs for prevention measures connected to the use of pesticides, exposure to pesticides, and also for general awareness. These programs should be designed for both adults and children. There is a pressing need

to lessen the dangers posed by farmers' usage of pesticides. It is possible to make use of a wide variety of activities that can be easily comprehended, such as seminars, photo and video presentations, and even performances, in order to demonstrate the dangers that pesticides pose to the health of both humans and the environment. In addition, the safe management of pesticide usage ought to be strengthened by means of training for farmers who use pesticides on their crops. This training ought to be carried out by the Department of Agriculture in conjunction with the IADA.

Pathak, V. M.; Verma, V. K.; Rawat, B. S.; Kaur, B.; Babu, N.; Sharma, A.;... Cunill, J. M. (2022) conducted A study, Over the past few years, there has been a notable surge in the utilization of pesticides, resulting in detrimental effects on the environment, particularly the contamination of water sources and soil. A variety of pesticides are available, with the most commonly utilized types being organophosphates, organochlorine, carbamates, and pyrethroids. The potential adverse effects of these herbicides extend to both human health and the environment. In order to assess the impact and dynamics of pesticide transformation within a given environment, it is important to possess a comprehensive understanding of the many features associated with the physical and chemical characteristics of pesticides. Prior to authorizing the release of those pesticides into the environment, it is imperative to establish suitable management protocols to facilitate their conversion into chemicals that are devoid of toxicity. These are the entities that exhibit the greatest durability and frequently demonstrate resilience against decomposition when subjected to environmental conditions. The scientific community has been dedicating significant efforts towards the development of innovative approaches aimed at reducing the environmental impact of pesticides. Bioremediation is one of the many approaches and servers that are included in environmentally friendly management strategies. These strategies are used to either solve pesticide problems or develop alternative green solutions. The aforementioned discourse presents a demonstration of the effective utilization of microorganisms capable of decomposing pesticides, serving as a method to control pesticide contaminants in an environmentally sustainable manner. Hence, more investigation into the screening process of potent microbial strains and enzymes is important in order to mitigate the risks associated with pesticides, thus safeguarding human health and the environment.

3. OBJECTIVES OF THE RESEARCH

This research has the following objectives:

To study the effect of pesticides on agriculture and chemistry-based industries

To study the importance of pesticides for crop production

4. RESEARCH METHODOLOGY

The study being presented here is both descriptive and analytical in nature regarding Uttar Pradesh. In order to conduct this research according to its objectives, secondary sources were consulted to acquire data. It has been demonstrated in this discussion how to apply pesticides in an appropriate manner. In spite of the fact that some nations have made it illegal to use pesticides, India does not require any special authorization to put them to use. Farmers who apply pesticides to their crops are obligated to conduct research on the consequences of doing so. It is possible that cancer or another disease was caused by this.

5. RESULT (DATA ANALYSIS AND INTERPRETATION)

Table-1 Pesticides Distribution 2011-12

I. No.	Name of Pesticides	Target	Availability	Distribution
	Pesticides Powder	8172.00	20447.44	12566.28
	Pesticide liquid	938.00	2830.72	1838.58
	Fungicide	1388.00	3207.51	2124.76
	Weedicide	2372.00	5286.34	4369.43
	Rat killer	159.00	293.45	170.86
	Bio-pesticide	3026.00	3732.33	2951.15
	Total	16055.00	35797.79	24021.06

Source: Directorate of Agriculture, Pesticides Division in U.P.

The table presented above illustrates the distribution of pesticides throughout the period of 2011–12, providing an overview of the various characteristics associated with these substances. The high-yielding varieties (HYV) and hybrid cultivars of many crops exhibit greater vulnerability to pests and diseases compared to conventional crop varieties. The need for insecticides, fungicides, and weedicides in Uttar Pradesh has witnessed a significant increase since the initiation of the green revolution. The state government has established a target of distributing 16055.00 metric tons of various types of pesticides for the fiscal year 2011–12. The quantity of available pesticides in Uttar Pradesh during the

period of 2011–12 was more than double the targeted amount. The data indicates that there was an ample supply of pesticides, fungicides, weedicides, and similar substances in Uttar Pradesh during the period of 2011–12. Table 2: Elucidation of the persistence of insecticides, their ability to penetrate plants, and their rain-fastness rating Table 3 presents a comprehensive overview of many types of chemical pesticides, elucidating their characteristics and functions. Table 4 presents the general properties of various chemical classes of pesticides. Table 5 presents an elucidation of the pesticides employed throughout the country, including their respective domain names, codes, areas of application, and the corresponding quantities obtained, denoted by their respective values. Table 6 presents the authorized application of herbicides in wheat cultivation.

Table 2: pesticides consumption in different states

States/UTs	Total consumption (tones)			Per ha (kg) 2016-17
	2003-04	2008-09	2015-16	
Punjab	6780	5760	5743	0.74
Haryana	4730	4288	NR	0.62
Maharashtra	3385	2400	11665	0.57
Kerala	326	273	1123	0.41
Uttar Pradesh	6710	8968	10457	0.39
West Bengal	3900	4100	3712	0.27
Chhattisgarh	332	270	1625	0.26
Andhra Pradesh	2034	1381	2713	0.24
Odisha	682	1156	723	0.15
Gujarat	4000	2650	1980	0.13
Bihar	860	915	831	0.11
Karnataka	1692	1675	1434	0.10
Rajasthan	2303	3333	2475	0.05
Madhya Pradesh	62	663	731	0.03
All India	41020	43860	54121	0.29

Source: Directorate of Economics and Statistics (DES), GOI

Table 2 presents data on the consumption of pesticides in various states. The highest consumption was observed in Punjab, with a recorded amount of approximately

6780 metric tons per 0.74 km in the years 2003–2004, 5760 metric tons per 0.74 km in the years 2008–2009, and 5743 metric tons per 0.74 km in the years 2015–2016. On the other hand, the lowest pesticide consumption was found in Madhya Pradesh, with a recorded amount of 60 metric tons in the years 2003–2004, in Chhattisgarh with 270 metric tons in the years 2008–2009, and in Odisha with 731 metric tons per 0.15 km in the years 2015–2016.

6. CONCLUSION

Uttar Pradesh is the biggest population state in India, and it's playing a big role in agriculture these days. So we need to make the right choice that will work for sustainable development. Pesticides have both advantages and disadvantages. In the research paper, advantages and disadvantages are both explained.

While it is reasonable for consumers to express apprehension regarding the potential existence of pesticide residues in their food, there exists a dearth of conclusive scientific or medical evidence substantiating the adverse effects of such residues on the health of individuals consuming food within the United States. The conclusion drawn in this statement is derived from the results of risk assessment studies, which have shown significant discrepancies between the anticipated levels of pesticide exposure for consumers and the levels that are considered to be of toxicological concern. This conclusion was derived from the aforementioned findings. Epidemiological investigations have yielded certain indications of the possibility of adverse outcomes. Nevertheless, these studies have exhibited inconsistencies in their findings and have been constrained in their capacity to concurrently ascertain both illness occurrence and pesticide exposure.

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