ISSN: 2582-8118 ***Volume 1, Issue 6; Nov 2021***

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYSIS IN SCIENCE AND ENGINEERING

Web: https://www.iarj.in/index.php/ijrase/index

7. Chemical Fertilizers and Pesticides in Indian Agriculture

Prof. (Dr) Dillip kr. Choudhary
Head, Department of chemistry
C. M. Science, College, Darbhanga, Bihar.

ABSTRACT:

As a whole, Asia accounts for more than half of the world's pesticide use. Pesticide use in India is 12th globally and 3rd in Asia, behind only China and Turkey. The Indian economy relies heavily on the agriculture industry, which employs about 70% of the country's population. Pesticides and fertilisers are also essential components of modern agriculture. There was a need for the Green Revolution in order to effectively supply agricultural goods and feed an expanding population. Food and other agricultural goods might be produced more efficiently in developing nations like India by adopting high-yielding crops, altering farm machinery, and significantly increasing the usage of chemical fertilisers as a result of the Green Revolution. Chemical fertilisers and pesticides are now required for maximum agricultural productivity and to feed an ever-increasing population. Food grains could be grown and sustained, but the environmental and human health consequences of this form of farming were enormous. Pesticides were developed primarily with the goal of reducing damage to crops caused by insects and illnesses, but they also had the unintended effect of raising yield of crops. Increasing the use of chemical pesticides has contaminated the environment and has long-term implications for civilization, both at the same time.

KEYWORDS:

Fertilizers, Pesticides, Green Revolution.

Introduction:

As a result of India's dependence on agriculture, the majority of the country's experiments take place in this field, where some of the trials take advantage of and abuse the farmers. As a result of India's current move from organic to chemical farming, the country's population is experiencing significant health issues.

Pesticide exposure, whether in the workplace or in the environment, is linked to a slew of health issues. As of right now, India is Asia's largest pesticide producer and the world's twelfth largest pesticide user. [1]

Environmental impacts are sometimes overlooked in the evaluation of agricultural management methods, such as the greater use of agricultural chemicals or fertilisers, which are often viewed as a means of reducing total production costs and boosting quality and yield. Increased agricultural output and stable supplies are only possible with the use of fertilizers and pesticides. [2] Fertilizer treatment provides a wide range of nutrients necessary for crop growth and enhanced yield. Pesticide spraying can greatly reduce or offset the economic consequences of plant diseases, insect pests, and weeds on agricultural production. There have been worrying findings in several nations about the presence of agricultural chemicals in the land and water as well as in agricultural goods, as well as human blood and adipose tissue. [3]

Pesticides include insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators, and many others. The name includes a wide spectrum of substances. International organisations place a high priority on ensuring that agricultural chemicals, such as pesticides, are used in a manner that is safe for employees and the general public.

Pesticides represent a threat to human health and the environment, which has sparked a debate. Plants benefit from the usage of insecticides and fertilisers. This agrochemical product has a negative impact on farmers, and various policies have been implemented to address this. [4]

Blood pressure, cough, fever, cold, joint pain, gastric, headache, diabetes and stomach pain are some of the most common health concerns stated by farmers in the research area. Pesticides have been linked to headaches and other symptoms in some people. [5] Colds, high blood pressure, and headaches are common complaints among those studying in this area.

Because of the diseases that infest vegetables and cereals, people have even ceased planting them in their gardens. They are opposed to the use of chemicals in farming. People believe that pesticides cause them to become ill. Pesticides give people nausea and burning during application, they say. [6]

Toxic effects of pesticides are mostly influenced by the amount and duration of exposure. Acute and chronic toxicity can be caused by the amount of this chemical (dose) and how frequently (time) the material is exposed to. [7]

WHO Class		**LD_{50} for rats (mg/kg of body weight)**	
		Oral	**Dermal**
Class- 1a	Extremely Hazardous	Less than 5	Less than 5
Class- 1b	Highly Hazardous	5 to 50	5 to 200
Class- 2	Moderately Hazardous	50 to 2000	200 to 2000
Class- 3	Slightly Hazardous	Over 2000	Over 2000
Class- 4	Unlikely to present acute hazard	5000 or higher	

Table 1: Pesticides classification the basis of its toxicity

Review of Literature:

Monkombu Sambasivan Swaminathan, an eminent agricultural scientist in India, initiated the Green Revolution in 1960. It includes the use of high-yielding grain varieties, herbicides, and extensive irrigation to boost crop yields (Parayil, 1992[8]; Sebby, 2010). [9]

A substantial amount of harmful chemicals and heavy metals are released into the environment when these agrochemicals are produced by the industries that manufacture them.

They are poisoning the ground water and creating a wide range of serious illnesses, including cancer, asthma, diabetes, and cognitive impairments (He et al., 2005[10]; Sarwar, 2015[11], Government of India, 2016a).

In many regions of India, farmers do not wear safety masks, gloves, and other protective gear while spraying pesticides, resulting in the inhalation and cutaneous exposure of pesticides that can severely damage their eyes, skin, and respiratory system. It has been found that the amount of pesticide applied by spray farmers is linked to the symptoms of illnesses caused by exposure (Sharma and Singhvi 2017) [12].

In agriculture, pesticides can be natural or man-made compounds that are used to manage various types of plant pests, weeds, and diseases. Pesticides include, but are not limited to, herbicides, insecticides, fungicides, rodenticides, nematicides, and others. Insect pests are a major cause of crop losses in both developing and industrialised countries. Dhaliwal et al. (2015). [13]

There are many different ways to get rid of unwanted insects, but the most common one is to use natural resources like plants or animals to make insecticides. Pesticide control microorganisms, biochemical plant growth regulators, and natural pesticides (Biochemical Pesticides) are all included in biopesticides.

A long way has been made since the introduction and widespread use of more dangerous synthetic pesticides to regulate agriculture as early as the 17th century Koul (2011)[14]; Villaverde et al.(2016)[15]; Samada and Tambunan (2020)[16].

Objectives:

- To examine the use of pesticides and fertiliser in agriculture.
- To evaluate influence of pesticide and fertiliser on human health
- Different countries' pesticide and fertiliser use will be studied.
- To examine the classification of pesticide based on their toxicity level.

Research Methodology:

The study will be conducted using a descriptive research design. Objectives include assessing the negative effects of chemical agriculture on farmers, assessing the health state of farmers, and assessing the environmental problems of the farm.

Result and Discussion:

Table 2 shows the most commonly used chemicals, and they are used in the most concentrated form. 100% of those polled use urea; 67% use complex; 50% use DAP; 40% use potash; 30% use zinc sulphate; 20% use ammonium chloride. 50% use complex; 40% use DAP; 40% use potash; 30% use zinc sulphate. [[17]

Chemicals	Yes (%)	No (%)
Urea	100	-
Complex	67	33
DAP	50	50
Potash	40	60
Zinc Sulphate	30	70
Ammonium Chloride	20	80

Table 2: The chemicals used in maximum quantities

Increased fertiliser and pesticide use in Indian agriculture began in the 1970s as part of the Green Revolution to meet the nutrient needs of high yielding and fertiliser responsive types. In India, agriculture. [18]

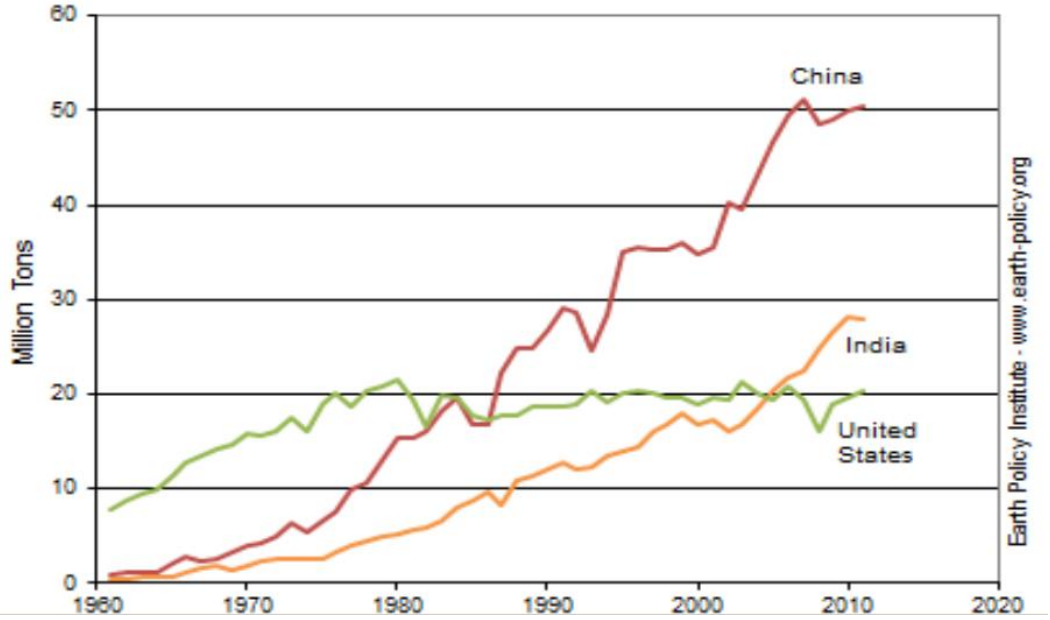

Fig. 1: Fertilizer Consumption in china, india and the united state

Cotton (45%), followed by paddy (22%), vegetables (9%), Plantation crops (7%), wheat (4%), pulses (4%), and others, are the crops that use the most pesticides in India (9%). [19]

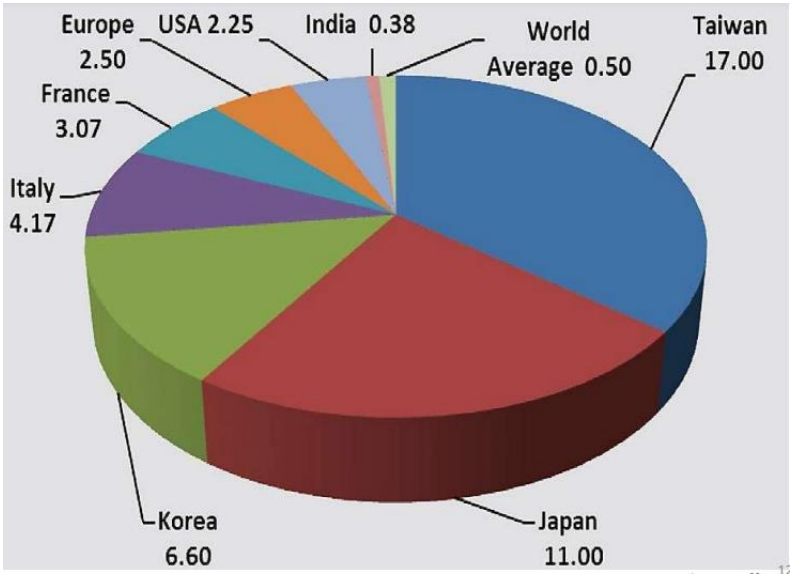

Fig. 2: Pesticide consumption (kg/ha) in different countries

Conclusion:

A large part of India's economy is based on agriculture, as it is in the majority of other developing countries as well. India's success in the green revolution is largely due to the inputs to agriculture provided mostly by the energy sector, fertilisers, pesticides, and land and water resource management. Our health, the environment, and the biosphere are all suffering because of the excessive, unrestrained, and unscientific use of agrochemicals. Many species of macro- and soil biota and flora are imperilled because of the pollution of the water, air, and soil that they cause, as well as the disruption of the nutrient cycle and of the pH balance. Agriculture uses pesticides, fertilisers, and vitamins as chemical substances to increase yields. Pesticides are chemical compositions used to kill pests, such as insects, fungi, rodents, and herbs, surrounding homes, schools, playgrounds, and agricultural lands. Insects, fungus, herbs, and rodents are all killed by the severe toxicity of these chemical compounds. However, prolonged exposure to toxic compounds is harmful to health. As a result, farmers need to be educated about organic farming's potential as well as its profitability and environmental sustainability. Many organic food stores have sprung up in India as a sign that the country's organic food consumption is expanding.

References:

1. Abou-zeid, N., R., & Abd-Ellah, H., F. (2015). Neurotoxic Effects of Gibberellic Acid (GA3) and its Withdrawal in Adult Male Albino Rats: A Light and Electron Microscopic Study. Global Journal of Pharmacology, 9(3), 222-233
2. Arora, S., Arora, S., Sahni, D., Sehgal, M., Srivastava, D., S., & Singh, A. (2019). Pesticides use and its effect on soil bacterial and fungal populations, microbial
3. Biomass carbon and enzymatic activity. Current science, 116(4), 25.
4. Bardale, R., Sonar, V., & Waghmare, S., (2012). Fatal poisoning with plant growth regulator: Chlormequat. J Punjab Acad Forensic Med Toxicol, 12(2), 102-3.

5. Devi, P., I., Thomas, J., & Raju, R. K. (2017). Pesticide consumption in India: a spatiotemporal analysis. Agricultural Economics Research Review, 29(347- 2017-2047), 163-172
6. Bhandari, G. (2014). An overview of agrochemicals and their effects on environment in Nepal. Applied Ecology and Environmental Sciences, 2(2): 66-73.
7. Kumar, N., Pathera, A. K., Saini, P. and Kumar, M. (2012). Harmful effect of pesticides on human health. Annals of Agri-Bio Research, 17(2): 125-127.
8. Parayil, G., (1992). The green revolution in India: A case study of technological change. Technology and Culture, 33(4), 737-756
9. Sebby, K., (2010). The green revolution of the 1960's and its impact on small farmers in India (Published Bachelor's thesis). University of Nebraska-Lincoln,Lincoln, Nebraska. Retrieved from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1027&context=envstudtheses
10. He, Z., L., Yang, X., E., & Stoffella, P., J., (2005). Trace elements in agroecosystems and impacts on the environment. Journal of Trace Elements in Medicine and Biology, 19(2-3), 125-140
11. Sarwar, M., 2015. The dangers of pesticides associated with public health and preventing of the risks. International Journal of Bioinformatics and Biomedical Engineering, 1(2), 130-136.
12. Sharma, N and Singhvi, R. (2017). Effects of chemical fertilizers and pesticides on human health and environment: A review. International Journal of Agriculture, Environment and Biotechnology, 10(6): 675-679.doi: 10.5958/2230-732X.2017.00083.3.
13. Dhaliwal, G. S., Jindal, V., & Mohindru, B. (2015). Crop Losses due to insect pests: Global and Indian Scenario. Indian Journal of Entomology, 77(2), 165–165. Retrieved from https://dx.doi.org/10.5958/0974-8172.2015.00033.4 10.5958/0974-8172.2015.00033.4
14. Koul, O. K. O. (2011). Microbial biopesticides: opportunities and challenges. CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources, 6 (056). Retrieved from https://dx.doi.org/10.1079/pavsnnr20116056 10.1079/pavsnnr20116056
15. Villaverde, J. J., Sandín-España, P., Sevilla-Morán, B., López-Goti, C., & Alonso-Prados, J. L. (2016). Biopesticides from Natural Products: Current Development, Legislative Framework, and Future Trends. BioResources, 11(2), 5618–5640. Retrieved from https://dx.doi.org/10.15376/biores.11.2.villaverde 10.15376/biores.11.2.villaverde
16. Samada, L. H., & Tambunan, U. S. F. (2020). Biopesticides as Promising Alternatives to Chemical Pesticides: A Review of Their Current and Future Status. OnLine Journal of Biological Sciences, 20(2), 66–76. Retrieved from https://dx.doi.org/10.3844/ojbsci.2020.66.7610.3844/ojbsci.2020.66.76
17. Lamichhane, R., Lama, N., Subedi, S., Singh, S. B., Shah, R. B. and Yadav, B. K. (2019). Use of pesticides and health risk among farmers in Sunsari district,
18. Nepal. Journal of Nepal Health Research Council, 17(1), 42: 66-70. DOI https://doi.org/10.33314/jnhrc.1204.

15. Akashe, M. M., Pawade, U. V., & Nikam, A. V. (2018). CLASSIFICATION OF PESTICIDES: A REVIEW. International Journal of Research in Ayurveda and Pharmacy, 9(4), 144–150.Retrieved from https://dx.doi.org/10.7897/2277-4343.094131 10.7897/2277-4343.094131

About the Journal

International Journal of Research and Analysis in Science and Engineering is Bi-Monthly research journal. The Journal is an international research publishing for supporting distinguished to research scholars, Lecturers, Professors, Principals and who are researching various areas of Science and Engineering. All research papers submitted to the journal will be double - blind and peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects. The Journal organizes many international conferences, symposia and workshops every year, and provides sponsor or technical support to researchers who wish to organize their own conferences and workshops. The Journal also publishes special issues for academic international journals in various areas of Science and Engineering.

KRIPA DRISHTI PUBLICATIONS

KRIPA-DRISHTI PUBLICATIONS
A-503 POORVA HEIGHTS, PASHAN-SUS ROAD, NEAR SAI CHOWK,
PUNE – 411021, MAHARASHTRA, INDIA.
MOB: +91 8007068686
EMAIL: EDITOR@KDPUBLICATIONS.IN
WEB: HTTPS://WWW.KDPUBLICATIONS.IN
JOURNAL LINK: HTTPS://WWW.IARJ.IN/INDEX.PHP/IJRASE