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STUDY OF CONTAMINATION OF GROUND WATER BY REGULAR USES OF PESTICIDES IN AGRICULTURE

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Abstract:-

A pesticide has been the prospective to contaminate groundwater resources as well as it has been become a courteous matter intercontinental. Ground water is a vital role in reservoir for life, as it pesticides dissolve easily from various causes through anthropogenic pursuit. There are many indirectly and directly pathways for pesticides to expand in groundwater, together with percolate, rainfall, and agricultural and soil runoff; However, occasionally the concentration appears to be lower than the acute toxicity level. However, its long-term vulnerability shows long-term effects on human health. Furthermore, a wide range of pesticides are known to have acute and chronic effects on human health even at low concentrations. Understanding the toxic effects of pesticides is of great interest for human, animal and environmental health risk assessment processes. In this context, several working organizations, including the World Health Organization and the US Environmental Protection Agency, are working to reduce and manage pesticide pollution by providing guidelines for good pesticide use practices. Here, we have discussed the mechanism of pesticide pollution along with its transport from land surface to aquatic life. In addition, the harmful effects of pesticides on human health and promising solutions to reduce pesticide pollution are also discussed.

Keywords –Ground water contamination, Production and use of pesticides in India, Pesticide use pattern, Advantages of pesticides, Hazards of pesticides, Factors Affecting Pesticide Toxicity in Aquatic Systems

Introduction

About 30% of the world's freshwater resources are groundwater. This represents 97% of freshwater that is potentially available for human consumption, considering that 70% of freshwater sources are frozen. Accordingly, groundwater may be the key to the sustainability of global water supplies and must be managed accordingly. Groundwater is widely used worldwide for domestic, industrial and agricultural purposes, and both urban and rural areas depend on groundwater resources to meet their water demands. Furthermore, due to its excellent biological and physico-chemical characteristics over surface water (rivers and lakes), it is mainly used as a source of drinking water. Nowadays, unfortunately, water is subject to the influence of large amounts of pollutants that cause serious damage to the environment. Agriculture has direct and indirect effects on the quality, rates, and structure of recharge and aquatic biochemistry. In particular, agricultural pollution includes the excessive and incorrect use of plant protection

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products and fertilizers, which, being partially water-soluble, can enter the soil and contaminate ground water used for drinking.

Ground water contamination

Groundwater pollution from pesticides is a worldwide problem. According to the USGS, at least 143 different pesticides and 21 transformation products have been detected in ground water, including pesticides from every major chemical class. Over the past two decades, discoveries have been made in the groundwater of morethan43 states. During a survey in India, 58% of drinking water samples taken from various hand pumps and wells around Bhopal were contaminated with organo-chlorine pesticides above EPA standards (Cole and Bagchi, 1995). Once groundwater is contaminated with toxic chemicals, it can take years to recover or cleanup. Cleanup can be very expensive and complex, if not impossible.

Production and use of pesticides in India

Pesticide production in India began in 1952 with the establishment of a plant for the production of BHC near Calcutta, and India is now the second largest producer of pesticides in Asia after China and the twelfth globally. Production of technical grade pesticides in India has increased steadily from 5,000 MT in 1958 to 102,240 MT in 1998. In 1996-97 the demand for pesticides in value terms was estimated at Rs. 22 billion, which is about 2% of the total global market. Pesticide usage patterns in India are generally different from the rest of the world. The major use of pesticides in India is for cotton crops (45%), followed by rice and wheat.

Table: - Pesticides use in India and World

Sr. No.	Pesticides	India	World
1	Fungicides	13	21
2	Herbicides	10	30
3	Insecticides	76	44
4	Other	01	05
	Total	**100**	**100**

Chart: -Pesticides use in India and World

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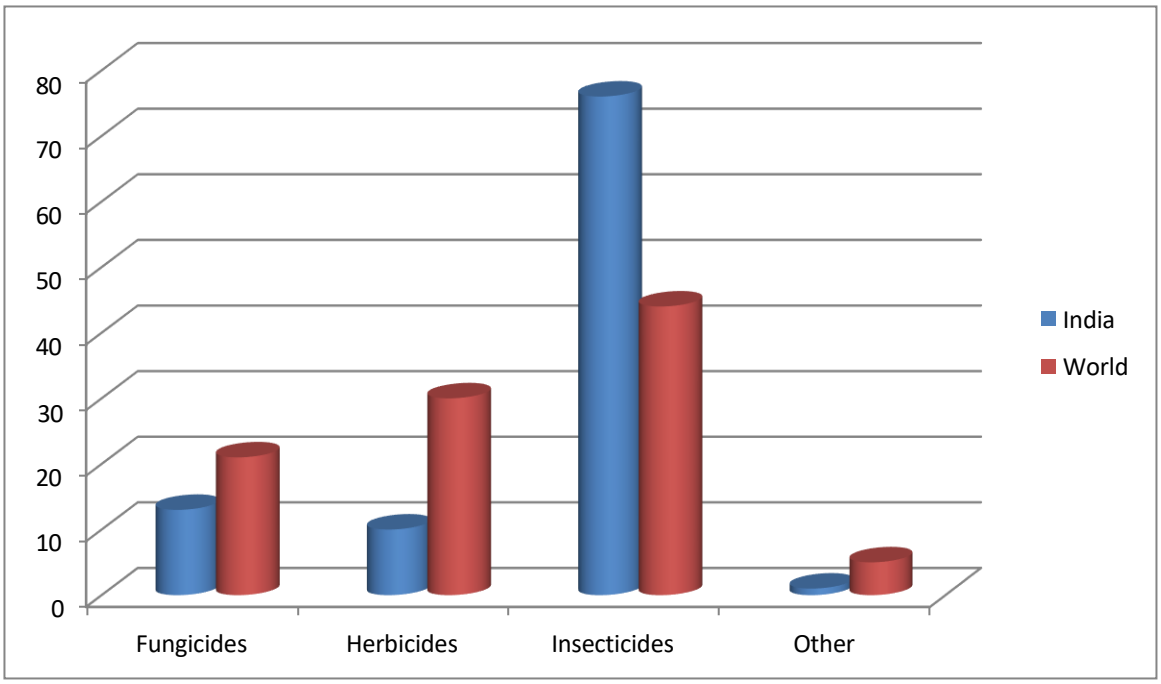

Pesticide use pattern.

Advantages of pesticides

Primary benefits are the results of the effects of pesticides - the direct profits expected from their use. For example, the effect of caterpillars on the crop results in higher yield and better quality of cabbage being the primary benefit. Three main effects lead to 26 primary benefits ranging from protecting recreational turf to saving human lives. Secondary benefits are less immediate or less obvious benefits resulting from primary benefits. They may be subtle, less intuitively obvious, or chronic. This is because secondary benefits are more difficult to establish cause and effect, but can still be powerful justifications for pesticide use. For example, higher production of cabbage can generate additional revenue that can be put toward children's education or medical care, leading to a healthier, better-educated population. A variety of secondary benefits are identified, from healthier people to protected biodiversity.

1. Improve productivity

The utilization of pesticides has been yielded enormous benefits in forestry, public health and the domestic sector - and in agriculture, on which our economy is heavily dependent. Food grain production, which was only 50 million tonnes in 1948-49, almost quadrupled to 198 million tonnes by the end of 1996-97 from 169 million hectares of permanent cropland. This result has been achieved through the use of high-yielding varieties of seeds, advanced irrigation

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technology and agrochemicals. Similarly, production and productivity have increased dramatically in most countries, for example wheat production in the United Kingdom, maize production in the USA. Productivity has risen due to some factors, which includes the use of fertilizers, better varieties as well as the use of machinery. Pesticides were an imporatant part of the process which reduces losses from weeds, diseases as well as insects which can significantly reduce the volume of harvestable produce. Furthermore, some of pesticides in the environment undergo photochemical transformation to produce metabolites which are proportionally non-toxic to both humans as well as the environment.

2. Crop loss/yield reduction protection

In moderate soils, even under pitted conditions, rice warrants an effective and cost-effective weed control method, including control (weed) plots (behera), which can reduce rice yield by28 to 48% due to weeds during critical periods. Weeds lessen the yield of dry land crops by 37-79% .Severe weed infestation, especially in the early stages of crop establishment, results in a 40% reduction in yield. Herbicides provided both economic and labor benefits.

3. Vector Disease Control

A vector-borne disease has the most effectually treated by killing the vector. Insecticides were frequently the only practical way to control insects that transmit deadly diseases like malaria, resulting in approximately 5000 deaths a day. In 2004, a author “Bhatia” wrote that malaria is a leading cause of morbidity as well as mortality in the underdeveloped world and a major public health problem in our nation. Disease control strategy for livestock is also very important.

4. Food quality

In first world countries, it has been found that a diet rich in fresh fruits and vegetables outweighs the potential risks from eating crops with very low pesticide residues. A fatten body of evidence which shows that eating fruits as well as vegetables regularly reduces the risk of many diseases like cancers, high blood pressure, heart disease, diabetes, stroke, and other chronic diseases.

5. Other Sectors-Transport, Sports Complex, Building

The transport sector is a major user of pesticides, especially herbicides. Herbicides and pesticides are used to maintain turf on playing fields, cricket grounds and golf courses. An insecticide has secure buildings as well as other wooden structures from damage by termites or wood-boring insects.

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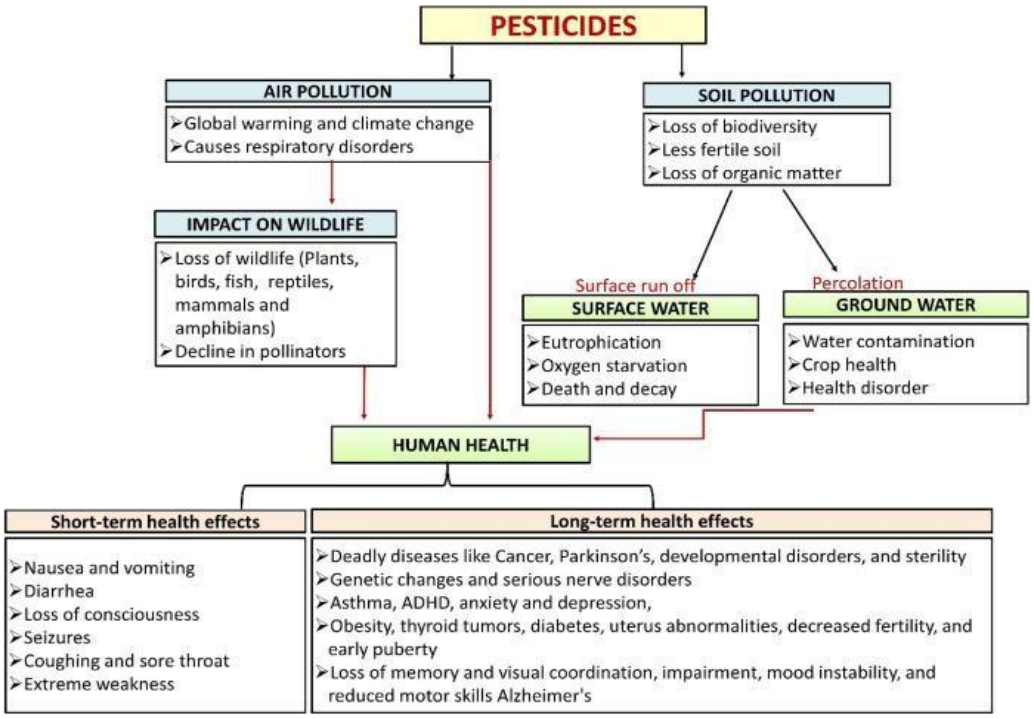

Hazards of pesticides

1. It directly affects people

Still, their disbenefits have serious consequences for the health of man and his terrain, If the credits of fungicides include increased product of food and fiber and increased profitable eventuality in terms of upgrading vector- borne conditions. There's now inviting substantiation that some of these chemicals pose a implicit threat to humans and other unwanted side goods to life and the terrain. No part of the population is fully defended from exposure to fungicides, and the potentially serious health goods, although disproportionately burdened, are shouldered by people in developing countries and high- threat groups in each country.

2. Impact through food goods

In order to determine the extent of fungicide impurity in foodstuffs, the program' Monitoring of Plant Origin in the Products of Fungicide remainders in the European Union' was started in 1996. In 1996, seven fungicides (Acephate, clopyrifos, clopyrifos- methyl, methamido phos, iprodione, procimidone and chlorothalonil) and two groups of fungicides (benomyl group and maneb group, i.e. dithiocarbamates) were anatomized in apples, tomatoes, lettuce, strawberries and grapes. The first report of fungicide poisoning in India was in Kerala in 1958, where further than 100 people failed after consuming parathion- defiled wheat flour.

3. Impact on the terrain

Fungicides can pollute soil, water, turf and other shops. In addition to killing insects or weeds, fungicides can be poisonous to numerous other organisms, including catcalls, fish,

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salutary insects, and non-target shops. Germicides are generally the most largely poisonous class of fungicides, but dressings can also pose a trouble ton on-target organisms.

4. Pollution of face water

Fungicides can reach face water through runoff from treated shops and soil. Water impurity by fungicides is wide. The result sofa comprehensive study by the US Geological Survey (USGS) of major swash basins across the country in the early tomid-90s was astounding. Further than 90 percent of water and fish samples from all aqueducts contain multiple fungicides at one or further times. Fungicides were detected in all samples from major gutters with mixed agrarian and civic land use impacts and in 99 percent of samples from civic aqueducts.

Factors Affecting Pesticide toxin in Submarine Systems

The environmental goods of fungicides in water are determined by the following criteria

1. toxin

Mammalian and non-mammalian toxin is generally expressed as the LD 50(" murderous cure") the lower the LD50, the lesser the toxin; Values of 0- 10 are extremely poisonous. Drinking water and food guidelines are determined using a threat- grounded assessment. Generally, threat = exposure (quantum and/ or duration) × toxin. A poisonous response(effect) can be acute(death) or habitual(an effect that does n't beget death during the test period but affects the test organism similar as cancer and excrescences, reproductive failure, growth inhibition, teratogenic goods, etc.).

2. Continuity

Half- life is measured by natural and abiotic declination processes. Biotic processes are biodegradation and metabolism. The inorganic processes are substantially hydrolysis, photolysis and oxidation. Ultra modern germicides have short half- lives that reflect the duration of time that pests need to be controlled.

3. Degradants

Declination processes can produce "degradants" that may have lesser, equal, or lower toxin than the parent emulsion. For illustration, DDT breaks down into DDD and DDE.

4. Fate (terrain)

The environmental fate (geste) of a fungicide is told by the chemical's natural affinity for one of four environmental chambers solid(minerals and particulate organic carbon), liquid(solubility in face and soil water), gassy form(volatilization), and biota. This geste is frequently appertained to as “partitioning” and includes, independently soil immersion measure(KOC); solubility; Henry’s Constant(H); and n- octanol/ water partition measure(KOW). These parameters are well known for fungicides and are used to prognosticate the environmental fate of fungicides. The presence of an contamination in a fungicide expression may be an fresh element but is not part of the active component. A recent illustration is the TFM lampricide, which has been used for times to control ocean lampreys in Great Lakes feeders.

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Conclusion:-

Insecticides are considered a fast, easy and low-priced solution for controlling weeds as well as pests in urban landscapes. However, the application of pesticides incurs noteworthy costs. Pesticides have adulterate almost every part of our environment as pesticide residues were found in soil as well as air and also in surface as well as ground water and also urban pesticide use contributes to this issue. Pesticide contamination poses note worthy risks to the environment as well as non-target bacteria ranging from beneficial soil microorganisms to insects, plants, fish and birds. Contrary to common misconceptions, herbicides can also harm the environment. In fact, herbicides can be particularly problematic because they are used in relatively large quantities. The best way to lesson pesticide contamination (and the damage it causes)in our environment is to use safe, chemical-free pest control (including weed control) methods for all of us. To control water pollution caused by other factors such as sewage or industrial waste, sewage should not be discharged into water bodies without proper treatment. Moreover, water needs to be continuously monitored and analyzed by appropriate agencies to avoid any kind of water contamination.

References:-

1. Research paper entitled “Impact of pesticides use in agriculture: their benefits and hazards” by Md Wasim Aktar, Dwaipayan Sengupta, Ashim Chowdhury. published in “science direct”
2. Researchpaperentitled“Firstevaluationofpesticidesoccurrenceingroundwaterof Tidone Valley, an area with intensive viticulture” by Roberta Zambito Marsala, Ettore Capri, Elisa betta Russo, Miriam Bisagni, Ruggero Colla, Luigi Lucini, A ntonio Gallo, Nicoleta Alina Suciu published in “science direct”
3. Research paper entitled “Contamination of groundwater resources by pesticides” by Muneer Ahmad Malla, Shruti Gupta, Anamika Dubey, Ashwani Kumar, Shweta Yadav published in “science direct”
4. Paper published in “Journal of Water Resource and Protection” Vol.2 No.5, May 2010 entitled “Water Pollution with Special Reference to Pesticide Contamination inIndia” by Anju Agrawal, Ravi S. Pandey, Bechan Sharma
5. Paper published in “springer” entitled “Pesticides in the hydro geo-environment: areview of contaminant prevalence, source and mobilisation in India” by Shijin Rajan, Musarrat Parween& N. JanardhanaRaju
6. Research paper entitled “Groundwater vulnerability to pesticide pollution assessment in the alluvial aquifer of Western Bengal basin, India using overlay and index method” by Srimanti Dutta gupta, Abhijit Mukherjee, Kousik Das, Avishek Dutta, Animesh Bhattacharya, Jayanta Bhattacharya published in “science direct”
7. Research paper entitled “Water Pollution and Agriculture Pesticide” by Samira Mosalaei

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