



## APPLICATION AND EFFECT OF PESTICIDES IN ENVIRONMENT AND HUMAN HEALTH.

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### ABSTRACT :

In developing country like India, a marketable surplus of agriculture is the most vital element which impacts the monetary improvement of a rustic. to meet the needs of agriculture items properly and to feed the growing populace, the phenomenon of inexperienced Revolution came into existence. inexperienced Revolution, allowed developing international locations like India to conquer chronic meals scarcity with the aid of producing extra food and different agricultural merchandise with the aid of the usage of high-yielding varieties of seeds, editing farm device, and considerably growing use of chemical fertilizers. For an finest production of agriculture produce and to feed the growing populace, utility of chemical fertilizers and insecticides has turn out to be necessary. Such type of agriculture practices allowed growth and sustainability of food grains however on the same time have the principal impact at the environment and human health. this article offers a sketch of consequences of chemical fertilizers and pesticides on human fitness and environment .(1)

synthetic pesticides are significantly utilized in agriculture to control dangerous pests and save you crop yield losses or product damage. because of excessive organic interest and, in certain cases, lengthy patience in the surroundings, pesticides may cause unwanted results to human health and to the surroundings. (2)

The dermal and inhalation routes of access are normally the maximum not unusual routes of farmers' exposure to insecticides. Dermal exposure at some stage in regular pesticide handling takes vicinity in body regions that stay uncovered through shielding garb, along with the face and the fingers. Farmers' publicity to insecticides may be decreased via less use of insecticides and through the appropriate use of an appropriate sort of non-public defensive device in all ranges of pesticide handling. (3)

### AIM AND OBJECTIVE :

- In growing international locations including India, approximately 800,000 people have misplaced their lives because of insecticides infection because the beginning of inexperienced revolution . about 20,000 humans lose their lives each year due to consumption of insecticides contaminated food and water .
- In keeping with a studies performed by using The India pesticides industry analysis, the marketplace size of pesticide enterprise in India might be 229,800 million by 2018. the use of pesticides in India has extended by using 17% due to the fact 1955. pesticides are quite poisonous, continual and bio-accumulative in nature.
- Because of their lipophilic characteristics, they get biomagnified within the food chain and might motive extreme health results .
- Health consequences of pesticides include neurological disorder, leukaemia, reproductive damage, multiplied hazard of Parkinson sickness, Alzheimer and beginning defects . Brief-time period publicity consists of nausea, vomiting, dizziness, headache, pores and skin rashes, muscle ache, respiratory disorders and so on. Pesticides also get gathered in human adipose tissue, blood and breast milk .
- This has become a serious environmental issue which is deteriorating the health of fresh in addition to marine surroundings. Insecticides in surface water can input via agricultural runoff and pose a severe chance as they are able to undergo the variations in water and may shape extra toxic compounds. There are numerous chromatographic techniques available for detection of insecticides.
- HPLC is one of the maximum reliable, reasonably-priced and green technique for the determination of insecticides in water, soil and food. HPLC is frequently blended with UV detector which is beneficial for the detection of a variety of pesticides. The advantage of this method over other techniques is that column can tolerate high pressure and flow cost .

### INTRODUCTION :

#### *What are Pesticides?*

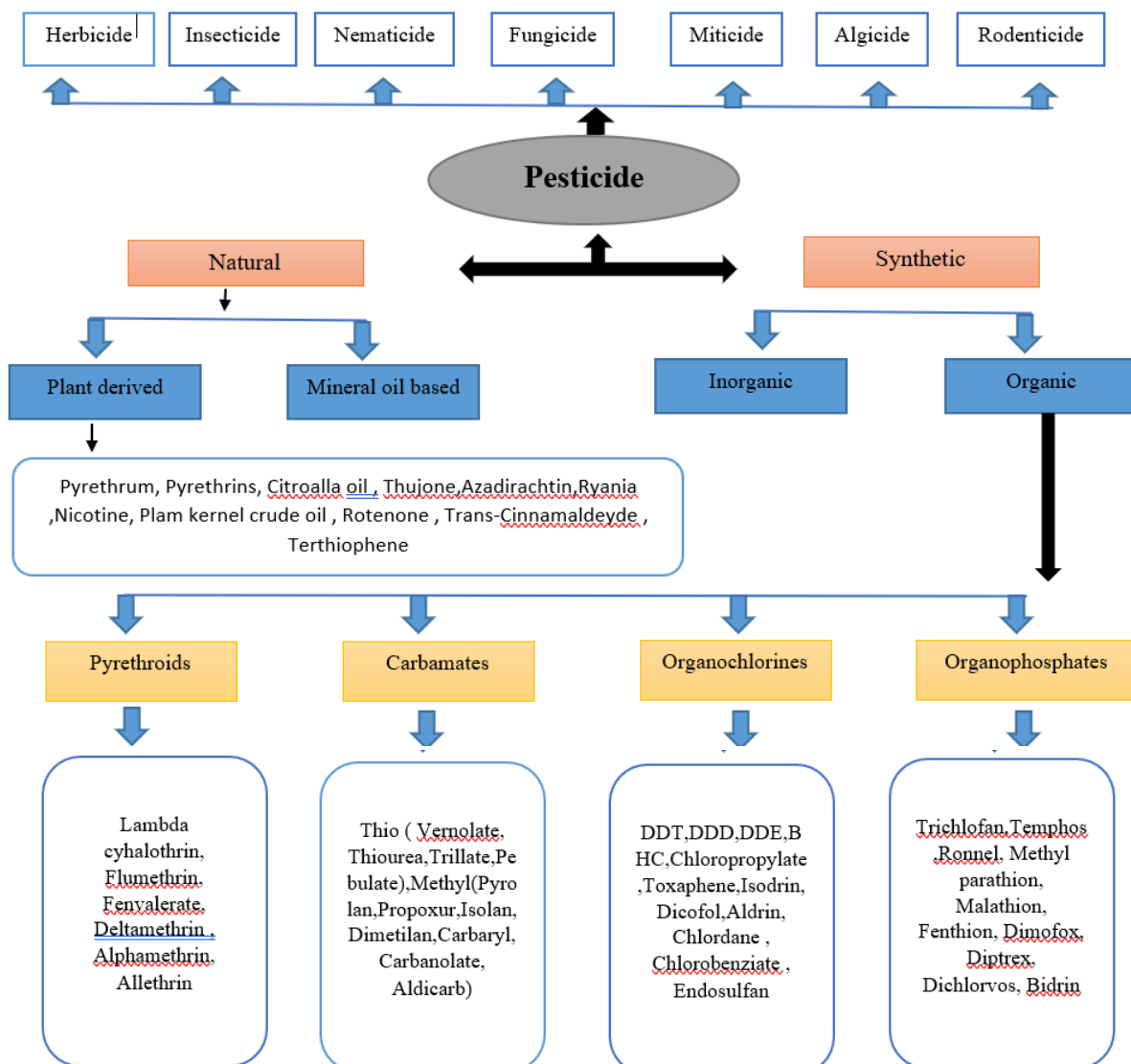
Many challenges confront humans to protect their plants for the reason that agriculture establish .Ment during New Stone Age, which happened among 7000 and 10,000 consisting of insects, plant diseases, weeds, and unfavourable animals. A extensive scope of organic and

nonorganic substances were given from animals, plant life, minerals, and microorganisms has been suggested to be effective for pest control. Plant extracts (the natural pesticides) have a longer records than the other forms of pesticides; the earliest agricultural natural pesticide turned into the nicotine which become used within the 17th century to manipulate plum beetle. due to the maturing chemical industry by way of the mid-20th century, less expensive and operative synthetic insecticides have been synthetic .(4)

**The food and Agriculture employer (FAO) has defined pesticide as:**

Any substance or mixture of materials supposed for preventing, destroying or controlling any pest, which include vectors of human or animal ailment, undesirable species of flowers or animals, causing damage during or otherwise interfering with the manufacturing, processing, storage, shipping, or advertising of food, agricultural commodities, timber and timber merchandise or animal feedstuffs, or substances that may be administered to animals for the manage of insects, arachnids, or other pests in or on their bodies.(5) The occurrence of harmful chemicals inside the environment has come to be an trouble of exquisite debate in recent many years . pesticides and other foreign substances in food products and consuming water at the side of toxic pollution in the air pose an instantaneous danger to human fitness, whereas other contaminants gradually building up within the surroundings and in the human frame, causing sickness long after first exposure .(6) lately, the capacity of certain pesticides to act as endocrine disrupting chemical substances (EDCs) has been assessed . those pesticides encompass sure organometallic compounds and lots of older organochlorine compounds that are additionally poisonous and continual. The latter have been banned from use in many nations within the Nineteen Seventies and Eighties, so exposures to these compounds had been decreasing ever because. but, those chemical compounds are fantastically persistent and small quantities are nevertheless present in the surroundings. due to the uncertainty surrounding how tons of a chemical is wanted to have an impact, similarly studies is required to allow willpower of the high-quality control technique. different insecticides along with organophosphates, carbamates, triazines, and pyrethroids that are less chronic and much less poisonous than the organochlorines were used to replace them, however many are now confirmed or suspected to behave as endocrine disrupting chemical substances .( 6)

**Classification of Pesticides :**



Reference no : 1: Current status of pesticide effects on environment, human health and it's eco-friendly management as bioremediation: A comprehensive review Vinay Mohan Pathak1\*, Vijay K. Verma1 , Balwant Singh Rawat2 , Baljinder Kaur3 , Neelesh Babu4 , Akansha Sharma5 , Seeta Dewali6 , Monika Yadav7 , Reshma Kumari8 , Sevaram Singh9,10, Asutosh Mohapatra11 , Varsha Pandey12, Nitika Rana13 and Jose Maria Cunill14 .

### **Types of Pesticides:- (6)**

These are grouped according to the types of pests which they kill:

#### **Grouped by Types of Pests They Kill :-**

1. Insecticides – insects
2. Herbicides – plants
3. Rodenticides – rodents (rats & mice)
4. Bactericides – bacteria
5. Fungicides – fungi
6. Larvicides – larvae

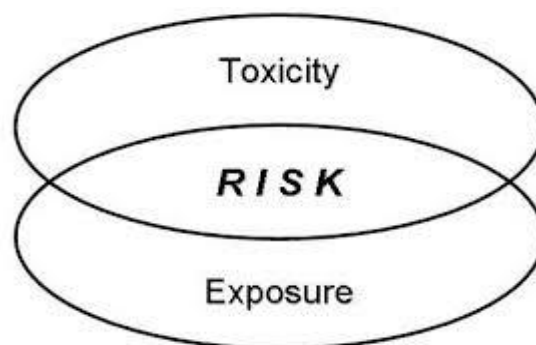
#### **Chemically-related pesticides:**

1. Organophosphates :- are mainly insecticides that disrupt the nervous system by interfering with enzymes that regulate neurotransmitters.
2. Carbamates :- similar to organophosphates, affect the nervous system by disrupting enzymes that regulate neurotransmitters, with reversible effects.
3. Organochlorine insecticides :- like DDT, chlordane, and toxaphene were widely used but are now phased out due to health, environmental concerns, and persistence.
4. Pyrethroids :- are synthetic versions of pyrethrin, a natural pesticide found in chrysanthemums. They are designed for increased stability in the environment.
5. Sulfonylurea herbicides :- such as pyriithiobac-sodium, bispyribac-sodium, are used for weed control.
6. Biopesticides :- are derived from natural sources such as animals, plants, bacteria, and minerals, offering environmentally friendly pest control options.

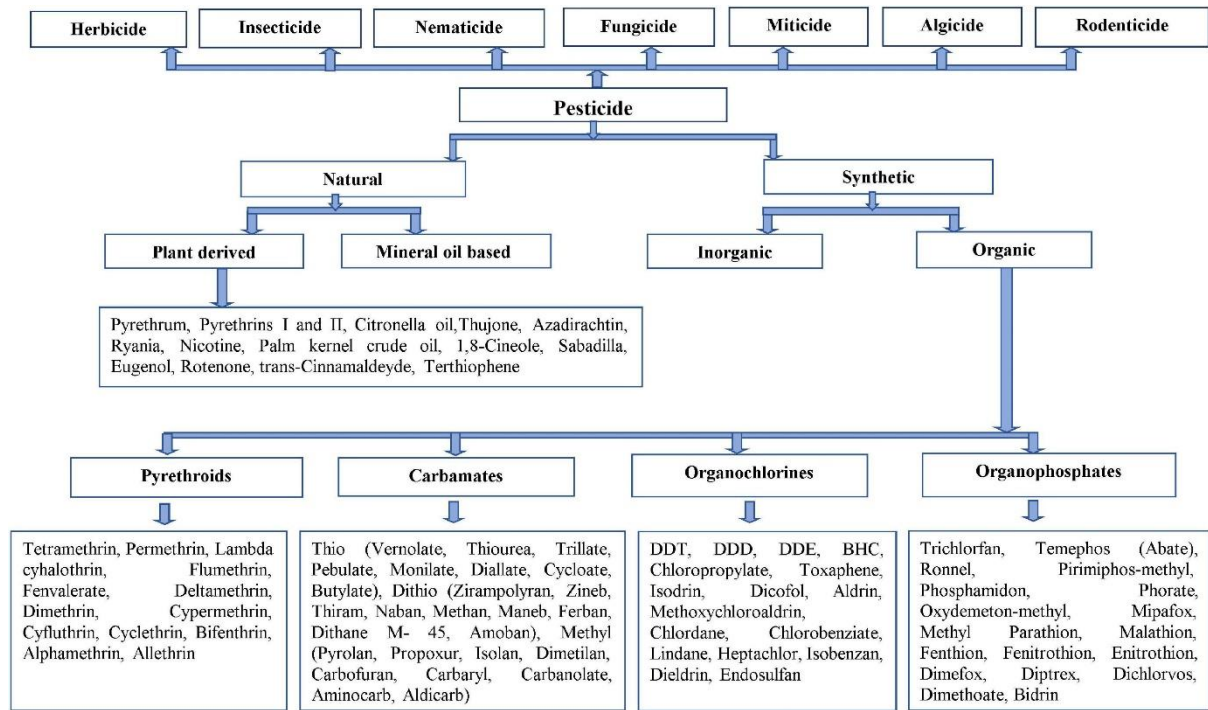
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### **Pesticide Toxicity and Risk (Hazard) (7)**

- When we talk about pesticides, it's crucial to understand the distinction between toxicity and risk. Toxicity refers to how poisonous a substance is, typically measured in labs using metrics like LD50 or LC50, which indicate the dose or concentration at which 50% of a reference organism would be killed. On the other hand, risk or hazard takes into account not just toxicity but also the likelihood of exposure during use.
- In simpler terms, toxicity relates to a substance's ability to cause illness or death, while risk encompasses both toxicity and the potential for exposure. Therefore, the risk associated with a pesticide depends on its toxicity and how much and in what form people are exposed to it.
- To assess risk, we need information about both toxicity and exposure. Generally, highly toxic pesticides pose a greater risk of adverse effects to humans than less toxic ones. However, factors like the pesticide's concentration in a product, the duration of exposure, and how it enters the body also significantly affect the risk of poisoning.
- While pesticide applicators may not have control over a pesticide's toxicity, they can manage the associated risks. For instance, a tightly sealed container of a highly toxic pesticide poses little risk until it's opened. Even after opening, the risk remains low if protective gear is worn. However, if the container is damaged or protective measures aren't taken, the risk of harm increases significantly.

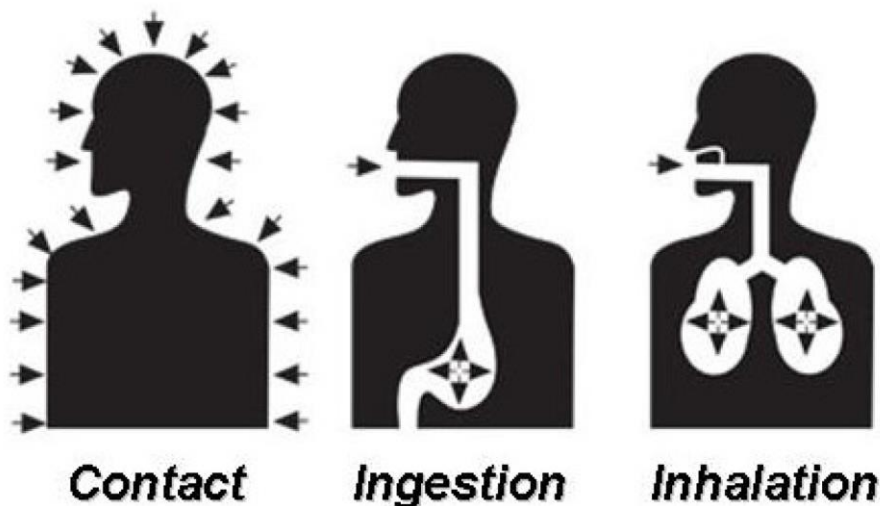


Reference no :2



### Classification of Toxicity by Route of Entry (8)

Insecticides can input the human body by three not unusual methods: via the pores and skin (touch), the mouth (ingestion), and the lungs (inhalation) (determine 2). The country of the chemical, i.e., stable, liquid, or gas, impacts the possibilities of pesticide penetration into the body . Liquid or gasoline products can get into the body thru all three routes of access, whereas solids have a tendency to have a decrease threat of access via the lungs. however, if stable particles of the pesticide are small sufficient or in the event that they continue to be at the skin long sufficient, penetration into the body can take place inside the identical approaches as the ones of drinks or gases. The most commonplace pathway for pesticide poisoning amongst common users is absorption thru the skin . Dermal absorption can also occur because of splashes and spills when dealing with (mixing, loading or eliminating) pesticides.. through the skin (touch), the mouth (ingestion), and the lungs (inhalation) (parent 2). The kingdom of the chemical, i.e., strong, liquid, or fuel, impacts the chances of pesticide penetration into the frame . Liquid or gasoline products can get into the frame through all 3 routes of access, while solids have a tendency to have a decrease risk of entry via the lungs. but, if stable particles of the pesticide are small sufficient or in the event that they stay on the skin long enough, penetration into the frame can take area in the identical ways as the ones of beverages or gases. The most commonplace pathway for pesticide poisoning amongst not unusual customers is absorption thru the pores and skin . Dermal absorption can also arise because of splashes and spills whilst managing (mixing, loading or eliminating) pesticides. To a minor diploma, dermal absorption might also arise from exposure to splendid load of residues. The diploma of risk with the aid of dermal absorption relies upon on the toxicity of the pesticide to the pores and skin, the duration of the publicity, the pesticide system, and the body component contaminated . Powders, dusts, and granular insecticides typically don't penetrate the skin or other body tissues as easily as liquid formulations, which reduces the risk of absorption and potential health issues. On the other hand, liquid insecticides containing solvents (e.g., organic solvents) and oil based totally pesticides commonly are absorbed more quickly than dry insecticides. for instance, the emulsifiable concentrates, containing a extremely good percent of the poisonous substance in a especially small amount of solvent, are conveniently absorbed by means of the pores and skin. positive frame regions are greater susceptible to absorption of pesticides.



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## EFFECT OF PESTICIDES

- Pesticide impact on the soil system** :- Pesticides are normally used to defend the crop, but there are several methods wherein they can also contaminate the soil. a number of the commonplace motives consist of irrelevant use, a loss of records on how to use them in phrases of amount, a excessive quantity of runoff into water bodies, and pesticides which might be adsorbed, desorb, and broken down in the course of their passage through soil, and those phenomena are depending on pesticide residences such as endurance, bio-accumulation, and toxicity. due to this method, the soils come to be secondary sources of the pollution with respect to air soil alternate. according to the report, in eu countries, the distribution of 76 pesticide residues became evaluated in 317 agricultural pinnacle soil samples, both they contained one pesticide or a couple of . Insecticides are used excessively and arbitrarily on various crop species, inflicting harm to useful biota which include microorganisms, honey bees, predators, birds, vegetation, and small animals .(9)
- Effect of pesticide on water eco system Water** :- is one of the crucial elements for all forms of lifestyles on the earth. about 71% of the water is included by using the earth's surface. Groundwater constitutes approximately 30% of the sector's freshwater resources. Groundwater best is under risk due to rapid populace increase, urbanization, industrialization agricultural insecticides, and populace pressure. pesticides may also get into groundwater because of agricultural runoff from the sphere or maybe direct application. The presence of insecticides in water resources is a purpose for worry. insecticides are a kind of hazardous chemical that poses a health risk to people. in many locations within the international, groundwater is the most sizable source of drinking water. Pesticide pollution is generated from poorly managed agricultural operations and contaminates the surface and ground water. It reduces the fine of drinking water to be had .  
some of the insecticides, organochlorine pesticides (OCPs) have been extensively used across the world to govern agricultural pests and vector borne diseases (malaria and dengue). Organochlorine pesticides are non-volatile compounds. (9)
- Effect of chemical pesticides on plants** :- these days, chemical pesticides are extensively used by farmers on agricultural land to control weeds, bugs, micro organism, fungus, mollusks, rodents, and so on. To combat their needs, an increasing populace is demanding more meals. pesticides are used for better crop manufacturing . The pesticide defends vegetation in agricultural land and additionally minimizes the hazard of harm for the duration of submit-harvest garage. it's far very powerful and successful in controlling some of diseases in vegetation in addition to people, such as malaria and typhoid, however alternatively, it decreases the soil excellent of agricultural land, that's the reason that their bad consequences are saved in thoughts. In 1960, most of the technologically advanced countries banned or confined the usage of pesticides. preferably, a artificial or chemical pesticide have to be poisonous or lethal to the centered or non-target species. because of considerable use of insecticides, the pests and bugs are going to develop resistance to converted insecticides like DDT and break out from it . (9)
- Effect of pesticides on human health** :- The human body receives publicity to insecticides both without delay or in a roundabout way. When insecticides are applied to crops, people can directly encounter them, affecting areas like the skin, eyes, mouth, and respiratory tract., and cause acute reactions together with headache, inflammation, vomiting, sneezing, and rashes at the pores and skin. The severity of these pesticides on people relies upon upon publicity time and concentration. typically, insecticides are released from the frame within the shape of excretion (urinary, biliary, and secretory gland). The intake of such veggies and culmination that are grown in pesticide contaminated soil and water used for lengthy-time period, accumulation boom the awareness of toxins within the body organs and reasons continual diseases inclusive of neurotoxicity, most cancers, necrosis, asthma, reproductive sickness, cardiac ailment, diabetes, and many others. The quaternary nitrogen compounds inclusive of paraquat are related to neurodegenerative diseases like Parkinson's, however their molecular mechanism are still now not widely known (Franco et al., 2010). Additionally, carbamate pesticides inhibit the activity of acetylcholinesterase (AChE), which serves as a biomarker for neurotoxicity. (9)

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## Use of pesticides :

- Primary blessings these are the effects of the insecticides' outcomes the direct gains anticipated from their use. as an example, the effect of killing caterpillars prevents them feeding on the crop and brings the primary benefit of better yields and better fine of cabbage. From the 3 predominant outcomes indexed above, 26 number one blessings were diagnosed ranging from safety of recreational turf to stored human lives.meals vegetation must compete with 30,000 species of weeds, 3,000 species of worms and 10,000 species of plant-consuming bugs. And threats don't prevent as soon as vegetation leave fields – insects, molds and rodents can all purpose damage in storage. insecticides can prolong the lifestyles of crops and prevent put up-harvest losses.(10)
- Secondary benefits these are the less instantaneous, much less intuitively obvious, or long run consequences. It follows that for secondary blessings, it is extra difficult to set up reason and impact, however nonetheless they can be powerful justifications for pesticide use. for instance, higher cabbage yield might bring additional revenue that would be placed toward kids's schooling or medical care, leading to a healthier, higher knowledgeable populace. There are 31 secondary advantages identified right here, ranging from fitter human beings to conserved biodiversity
- There may be a large range of high quality outcomes from exclusive sorts of pesticide use. decreased crop loss as a result of spraying fungicides is an apparent gain, but a few are much less apparent either because they arise inside the medium or long time, or are subtle or small incremental advantages disbursed over a massive region. To facilitate a systematic analysis able to unravelling the many capacity blessings of pesticide use, a hierarchical version of results became adopted, comprising consequences, primary advantages and secondary benefits.
- Results effects are the instantaneous outcomes of pesticide use—for example killing caterpillars on a cabbage. those are not classed as advantages due to the fact the effects of the effects have no longer manifested themselves but. The three major results of pesticides are:

- Controlling agricultural pests (along with diseases and weeds) and vectors of plant disease.
- Controlling human and cattle disease vectors and nuisance organisms.
- Preventing or controlling organisms that damage different human sports and systems.

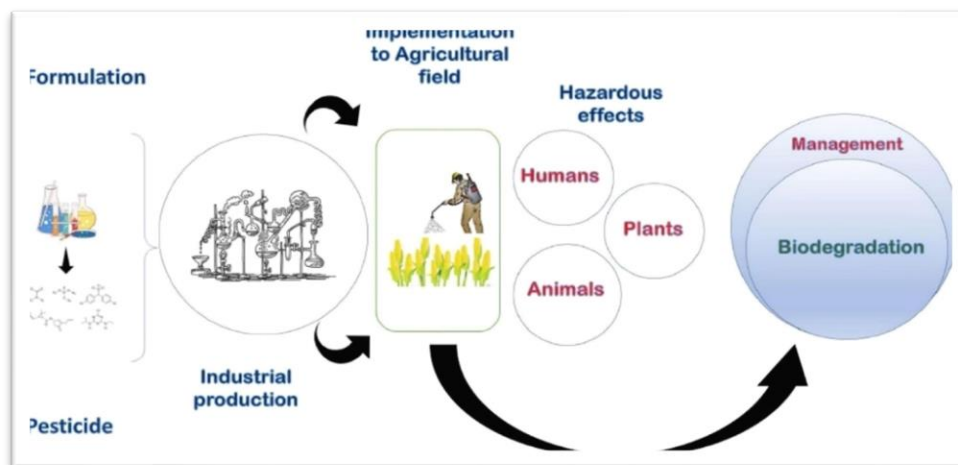


Fig :5 Pesticides Eco-Friendly Biodegradation (4)

## Result & Conclusion :

- Via reviewing the literature, it can be concluded that the farmers do now not observe appropriate protection precautions with reference to pesticide application, huge quantities of pesticides are inappropriately utilized by these farmers, leading to numerous human health disorder,(10)
- Polluting our air, land, water. for the reason that about predominant share of the population is predicated on agriculture for subsistence, the pesticides are used very widely in agricultural subject to increase the manufacturing through shielding the yields from capability danger. To guard human lifestyles and surroundings from the toxic results of insecticides, adequate steps need to be taken. Now it's far a well installed truth that there's the foremost need to leap forward toward our mother earth by means of nurturing it with the aid of going for the organic farming gadget.
- An answer to this havoc is the natural farming, an environmentally friendly agricultural method which in the long run results in right human health. shifting back to our ancestor's path by means of performing natural agriculture is a step in the direction of sustainability. natural agriculture is a holistic manufacturing and control system that is supportive of the surroundings, fitness and sustainability.
- Even though the government of India has been making concerted efforts to inspire farmers and those concerning organic produce and product, but it has now not resulted in bridging the distance between the demand and supply of organic product in the marketplace. A proper education must accept to the farmers regarding natural farming, its scope, capacity are accomplished.
- Earnings and surroundings sustainability. it's been administered that natural food intake is growing in India and that is evident from the fact that many organic meals stores are set off up in India. So, working upon niche vicinity of natural farming is but to be explored and flourish.

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