"Load Of Pesticide On Environment"

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DOI: 10.29322/IJSRP.11.04.2021.p11245
http://dx.doi.org/10.29322/IJSRP.11.04.2021.p11245

Abstract- In agriculture, the use of pesticide has been the dominant form of pest management since the 1950s to kill pest organisms including insects, weeds, fungi and nematodes. In recent times, use of pesticides in rice farming has increased rapidly and this scenario contributes significantly towards adverse effects on human health and environment. This paper reviews the environmental situation with regards to pesticides worldwide. It tracks the history and the current status of pesticides usage. The issues of institutional arrangement for pesticide research and development, and government policies and legislation regarding import, manufacture, registration, sale and distribution of pesticides are addressed. It also highlights incidences of occupational and accidental poisoning, and environmental contamination. The sources and chances of pesticide pollution are pointed out with suggestions for prevention of environmental degradation through them. The threat is the degradation of ground water quality as a result of contamination by fertilizers and pesticides. The goal is prevent the occurrence of ground water contamination by misuse of fertilizers and pesticides.

Index Terms- pesticide, insecticide, environmental contamination, fertilizer

Introduction-

Chemicals are becoming indispensable part in our daily life. They are related to our nutrition, medicine, and use as pesticides, fertilizers, petrol, paints, cosmetics, glue, varnish, artificial fibers, etc. despite these enormous use and benefits of chemicals they can cause and implicate some health and environmental problems. Examples of problems associated with them they can cause diseases like cancer, kidney, endocrine disrupting, and acute poisoning or cause environmental problems like ozone depleting, effect on terrestrial and aquatic animals, contamination on environmental media (air, water, food, land). All these are making clear to everyone that "chemical safety – a national challenge" is not an empty phrase.

Among the agrochemicals a large number of chemicals such as pesticide and insecticide are included which are used to suppressor eliminate the population of undesirable organism from a site . In pursuit to feed an ever increasing size of population man had to improve methodology and develop further sophisticated technology for raising quantum of cereals, vegetables, fruits and livestock. As various kinds pathogens, insects, pests, nematodes and rodents had concern with crop plantations and vegetables and other forms of agricultural products, control of these organism was indispensable. Ways and means were sought by scientists and farm experts and desired targets were achieved to a great extent.

The number of organisms causing disease and pestilent insects has been estimated to be over 86000 besides a large number of species of fungi, ticks mites and nematodes. In view of experts these organism on a global scale can cause a lose over 50% of total world foodstuff production.

PESTICIDE:-

Many chemicals possess the capacity of suppressing or eliminating unwanted organism while causing none or limited damage to the desirable organism such are represented by pesticides.

These have been given distinct name after the type of organism against which they are used for eradication these are-

(1)Insecticide used as poison against insects
(2)Herbicide used to control unwanted weeds
(3)Fungicide used for suppressing fungal infection
(4)Rodenticides used for eradicating unwanted rodents
(5)Molluscicides used for eradicating unwanted mollusks
(6)Piscicides used for eradicating unwanted fishes
(7)Algicides used for eradicating unwanted algal matter

Various organo chlorine, organophosphate derivatives, carbamates, thiocarbamates, triazines, biphyridils, urea, nitrites, nitro anilines, amides, phenols derivatives or arsenic, copper and mercury and even diesel and kerosene may be employed as pesticides.

Figure 1- captured photograph of some pesticides

(1)INSECTICIDES:-

It is based on the fact that they implicate such vital organs or system in the body of organisms to be eliminated or eradicated which are already non existent in organism to be protected. In most cases the effect is severe on the nervous system with the result that the insect with damaged nervous system no harm worth noticing is done to its growth and productivity. The insecticides is commonly used are-

(a)Organo-chlorine insecticide
(b)Organo-phosphate insecticide
(c)Carbamate and miscellaneous chemicals

(a)ORGANO-CHLORINE INSECTICIDE:-

These Insecticide include chlorinated derivatives of ethane such as DDT, DDD, methoxychloro etc. cyclodine which include aldrin, dieldrin, heptachlor, toxaphene etc. and cyclo hexanes such as lindane in general it can be concluded that these are very stable chemicals which can withstand the action of various environmental factors like temperature, solar radiations, moisture for long duration of time they are responsible for their prolonged toxicity of insects and other pests. They have a broad spectrum of action which involves the nervous system affecting transmission of nerve impulse.

Table 1- toxicity per kg of different insecticide

INSECTICIDE	TOXICITY
(1)Organo-chlorine Insecticide	
DDT	113mg/Kg
DDD	3400mg/Kg
Aldrin	39mg/Kg
Dieldrin	46mg/Kg
Heptachlor	100mg/Kg
Lindane	88mg/Kg
Toxaphene	60-70mg/Kg
(2)Organo-phosphate Insecticide	
Tepp	13mg/Kg
Parathion	13mg/Kg
Malathion	1375mg/Kg
(3)Carbamate Insecticide	
Aldicarb	0.8m/Kg
Carbaryl or sevin	850g/Kg
Baygon or propoxur	83mg/Kg

(b) ORGANO-PHOSPHATE INSECTICIDE:-

These are preferred over organo chlorine derivatives because of better performance in eradication of unwanted organism. These are effective over a wide range of pestilent insects and are quickly degraded into harmless metabolites with in a period of three months after the application.

Though fat soluble are capable of rapid penetration into living organism they are never deposited in appreciable extent with a living system. These are required in much lower amounts than are most of the organo chlorine derivatives to prove satisfactory result.

Most of these have been found to implicate the central nervous system of the target organism like organo chlorine derivative and inhibit the activity of the enzyme acetylcholine esterase. The latter is known to be responsible to catalyze to removal of acetylcholine from the synaptic cleft after an impulse has passed through the cleft.

(c) CARBAMATE INSECTICIDE:-

These chemicals are analogues of carbamic acid which is very effective against many insects and pests. These compounds have a lower toxicity to mammals than organo phosphate derivatives.

Carbamate insecticides are readily degraded in the environment and in a living system also they are easily detoxified and excreted . The insecticidal activity of carbamate compounds because of competitive inhibition of enzyme acetyl choline esterase.

The BHOPAL GAS TRAGEDY of India on Dec. 3, 1984 created a historic period episode of toxic gas leakage which killed 2890 people and 3000 cattles and more than 20000 people were affected with the chronic poisoning by this chemical.This involved methyl iso cynate which proved to be the killer gas carbaryl sevin manufactured in this factory.

(2) HERBICIDE:-

Herbicide are chemicals which is used to suppress or eradicate undesirable herb like plants (weeds) The use of herbicide causes contamination of our food and water supplies like various insecticides (Agnihorudu, 1982, Edward, 1983)

The advantage is that many herbicide like have lower toxicity to mammals. However herbicides like 2,4-D and 2,4,5-T are extremely toxic to higher animals including man.

Table 2- Toxicity of herbicides per kg

Sr. N.	NAME OF HERBICIDE	TOXICITY
(i)	Chlorophenoxy acetic acid	
	(1) 2,4-D	300-1000mg/Kg
	(2) 2,4,5-T	300-1000mg/Kg
(ii)	Dinitro phenols	
	(1) DNOC	30mg/Kg
	(2) DINOSEB	30mg/Kg
(iii)	Diphytidyls	
	(1) Paraquat	70-125mg/Kg
	(2) Diquat	About 400mg/Kg
(iv)	Substituted Urea	
	(1) Monuron	3000-5000mg/Kg
	(2) Diuron	3000-5000mg/Kg
(v)	Triazene Derivatives	
	(1) Simazine	About 2000mg/Kg
	(2) Atrazine	About 100mg/Kg

Figure 2- Captured photograph of crop affected by insects

(3)FUNGICIDE:-

Fungicide are chemical used for killing or eradicating fungi. Before onset of fungal infection these chemical may be used to nullify fungal attack

Compounds containing mercury are generally deadly poisonous. Consumption of grains treated with organo mercurales has resulted in many deaths and permanent neurologic disability in humans Pakistan and Iraq and other countries.

Table-3 Toxicity of different fungicide per kg

Sr. N.	NAME OF FUNGICIDE	TOXICITY
(1)	Di thio carbamates	
	(a)Dimethyl dithio carbamates	Mildly toxic to mammalian system
	(b)Diethyl dithio carbamate	Mildly toxic to mammalian system
(2)	Substituted aeromatics	
	(a)captan	9000-12500mg/Kg
	(b)fopten	10000mg/Kg
(3)	Substituted aeromatics	
	(a)Pentachyl	30-100mg/Kg
	(b)Pentachloroni tribenzene	1200-1650mg/Kg
	(c)Hexachlor benzene	3500-4000mg/Kg

Application of pesticides and exposed population in various sectors

Various methods of application; however some methods greatly dominate the use. The common methods can be listed below;

- Mixing grains with protect ants of low mammalian toxicity to control stored products pests.
- Baiting for the control of locusts, grasshoppers and rodents.
- Dusting for the control of agricultural and public health pests (restricted use).
- Fumigation for the control of stored products pests, seeds and goods moving through ports.
- Granular application for the control of soil and seedling pests.
- Treatment of water for the control of aquatic weeds, disease vectors (snails) and ectoparasites of animals (dipping).
- Seed-dressing against soil and seed borne pests and diseases using various crude and sophisticated equipment and devices.
- Spraying of liquid preparations by manual and motorized equipment, tractor mounted sprayers (herbicides) and aerial application for the control of pests of field crops and migratory pests.
- Aerosols.

Since insecticides has great health concern, it may be of great value to elaborate more in their quantities used, method and time of application in various sectors and exposed human population.

SOME SPECIAL FEATURE ASSOCIATED WITH USE OF PESTICIDE:-

In the use of two or more than two pesticidal chemicals it has been found that the resultant action may be of two kinds: Synergistic and Antagonistic.

SYNERGISTIC AND ANTAGONISTIC:-

Synergistic is the cumulative action of two or more than two foreign chemicals introduced simultaneously or one after another into biological system. A combination of Malathion with EPN OR Malathion with Phenothoate yield synergistic reaction as reported by Barker et.al (1978) Antagonistic action is the action of two or more than two chemicals introduced simultaneously or one after another this results in production of a milder toxic response than would normally be expected. Several organo chlorine insecticides are known to exercise a protective action against the acute toxicity of organo phosphate insecticides (Murphy, 1969) Typical instance of such action can be observed when malathion is administered with DDT. Here quick disposal of the insecticide mixture take place. Also accumulation of DDT in adipose tissue is considerably reduced when the animal is fed with Dieldrin (Street, 1969)

CHEMICAL BASIS OF TOXICITY OF PESTICIDE:-

In many cases toxicity of a substance may increase by addition of chemically inert group. For example addition of methyl group in 2,4-dinitro-5-methyl phenol the insecticidal activity which almost twist as strong as that of parent compound. On substituting

hydroxyl group in DDT a change in the spectrum of its activity occurs. The toxicity of chemical may also depend on the precise spatial arrangement of various compound group.l

DETOXIFICATION OF PESTICIDE AND ALLIED COMPLEX CHEMICALS:-

The process of detoxification involves abiotic or biotic transformation of pesticide into relatively harmless substances. Loss of toxicity naturally follows in cases active group are detached and in many cases a little change in structure of the compound detoxifies it completely. Substances which possess highly branched structure increased substitution aeromatic compound cyclo paraffins etc. are degraded with difficulty. As such they are said to show persistence (Rudd& Henman, 1972); Konar, 1975) Degradation of pesticide in environment involves two aspects of changes abiotic and biotic transformation-

(1)ABIOTIC TRANSFORMATION:-

It includes mainly photolysis , hydrolysis, cleavage of various types of bonds absorption by humic materials and other colloides and formation of stable complexes and formation of stable complexes with in the medium. Solar radiation presence of moisture, temperature the humic material and other substances present in the medium play effective role in abiotic transformation of poisonous substances in the environment.

(2)BIOTIC TRANSFORMATION:-

It includes biochemical reaction brought about by enzymatic set up of living organism. Pesticides are generally lipophillic compound so they react with enzyme system then they get convert to hydrophilic form. Important biochemical reaction which occur in a living system are of two kinds degradation reaction and conjugation reaction.

(i)DEGRADATION REACTION:-

In these reaction there is involvement of phenomena like oxidation reduction hydrolysis cleavage of important bonds etc. These reaction lead to displacement of important functional group of the pesticide molecules group like –OH, -COOH, $-NH_2$, etc. In these process many pesticide lose their toxicity.

(ii)CONJUGATION REACTION:-

Synthetic reaction in which the molecules of pesticide carrying groups like –OH, -COOH, $-NH_2$ etc. which are acquired during the earlier reaction are conjugated to other molecule with in the living system to form highly ionized water soluble substances. Although all living organism are capable of under going biodegradion tiny micro organism such as bacteria, algae, fungi, etc. play a important role in causing decomposition of pesticide in the environment.

PROBLEMS ORIGINATING FROM THE USE OF PESTICIDE:-

The use of synthetic organic chemicals has turned to be extremely hazardous pollutant of the environment and the biosphere. Some of the problem arising out of application of pesticide are given in berief below-

(i)In the present set up of our economy the use of synthetic pesticides has become a necessity. Fast expanding human population settlements intensive use of agriculture and production of higher input rate of waste material into environment are now interrelated features and these have undesirably created additional resources for various insects, pest and other harmful pathogen regulation through prey predator interaction have become effective due to irregular functioning of natural system mainly brought by man multifarious activities. The application of the synthetic pesticides after proper choice of effectiveness seem to be the only proper solution of the problem.

(ii)Most of the pesticides are deadly poisonous as such their handling is riskfull (Murty 1986, Shaff & Alam 1990) Unfortunately the selective the selective action of pesticides is never perfect and many non target organism include some useful animals are effected by their toxicity , for example elimination of some insects and bees which assist in pollination of many plants could cause heavy to prospectiveness of agriculture produce (Pimental et.al) non target organism facing risk of life include pet animals, livestock and poultry. Accidental exposure to these chemicals may happen with human being as well as human casualties may occur.

(iii)The chemicals are usually applied with the help of aerial or surface spraying device or simply dusted manually, Thus pesticides applied in the fields of tropics may reach arctic or sub arctic regions. Some of pesticides including DDT have already attained a global distribution. Most of the synthetic organics or their decomposition products persist in a toxic state in the environment for long duration. They get bioaccumulated and biomagnified in their existing. These feature occurring in an ecosystem cause at higher trophic levels. Persistence of DDT has been recorded for period as long as 25 years .

(iv)It is not advisable to reduce the use of pesticides in order to abate chances of pollution , in actual practice the uneven distribution of insecticides over the area under operation usually does not spare that is exposes many of the undesired organisms also, generally to lower concentration.

PERSISTENSE OF PESTICIDE: In water media the persistence of pesticides is related to these factors –

(i)Their chemical and physical properties

(ii)Dose and their preparatory formulation

(iii)Type of the soil its moisture content temperature

(iv)Physical properties of the soil components , soil microflora

(v)The presence of plant disease monger germs are also concerned with the persistence of pesticide.

FACTORS AFFECTING PERSISTENCE:-

(i)Leaching process
(ii)Adsorption
(iii)Decomposition
(iv)Volatilization

SR. N.	NAME OF PESTICIDE	DURATION OF PERSISTENCE
1	Organo chlorine insecticide	18 months
2	Derivatives of triazene, urea, picloram	18 months
3	Derivatives of benzoic acid, amides	12 months
4	Phenoxy alkyl carboxylic acid, nitrates	6 months
5	Organo chlorine, derivatives of carbamic acid	3 months

PESTICIDE POLLUTION:-

(I)Manufacturing waste
(ii)User waste
(iii)After application waste

ROUTES OF PESTICIDE INTO ENVIRONMENT AND HUMAN BEING:-

Safe and economical disposal of pesticide is the current problem of significant magnitude. It is estimated that approximately 2500835mt of 51 distinct pesticide were generating in US according to the USPEA survey 38% of this was pesticide manufacturing residue and the rest is discarded commercial product pesticide degradation in surface soil is affected by soil degradation and surrounding condition population micro organism and this metabolic capabilities, p^H, moisture, organic contain, temperature, aeration, cation exchange capacity. The extend of source of ground water contamination due pesticide is being determined increased persistence in surface soil increases probability of pesticide being carried to the ground water the knowledge of-

(a)Soil pesticide interaction
(b)Pesticide chemistry
(c)Agriculture management practices
(d)Kinetics of pesticide bio degradation

Will be required development strategy avoid or remedial ground water contaminants pesticide sorption degradation and water movement are the three process which control pesticide control in the ground water pesticide have a moderate to long half lives in soil those we can know sorption potential and water solubility have more chances to reach ground water in vedose zone and a aquifer (sub surface soil) less bacterial population less nutrient less oxygen are the limiting factor for biodegradation of pesticide . At the user level rising of container and application equipment generation with dilute concentration of pesticide soil spills mesiculation and mixing can produce unwanted pesticide residue , pesticide concentration in rinse water estimated to be 2500ppm annual volume of rinse water is estimated to the 226 million liters containing 1 lac 20000kg. of pesticide . These rinse water and residue discarded in unlined pits ultimately find their way to ground water 10-30% Ground splain of pesticide does not reach the target and less than 0.1% aerialy sprayed pesticide actually reaches the target and more than 50% of sprayed pesticide go to distant land due to air drift.

HUMAN HEALTH RISK OF PESTICIDE- The concentrations of active ingredients in field applications in rice farming activities may pose a threat to humans and animals. Thus, hazard identification which takes into account pesticide use, toxicity, and exposure potential can help prioritise pesticides of greatest health risk to rice farming communities. In general, it was found that there were three main ways pesticides could enter the farmers' bodies:

i) inhalation;
ii) skin contact and;
iii) ingestion

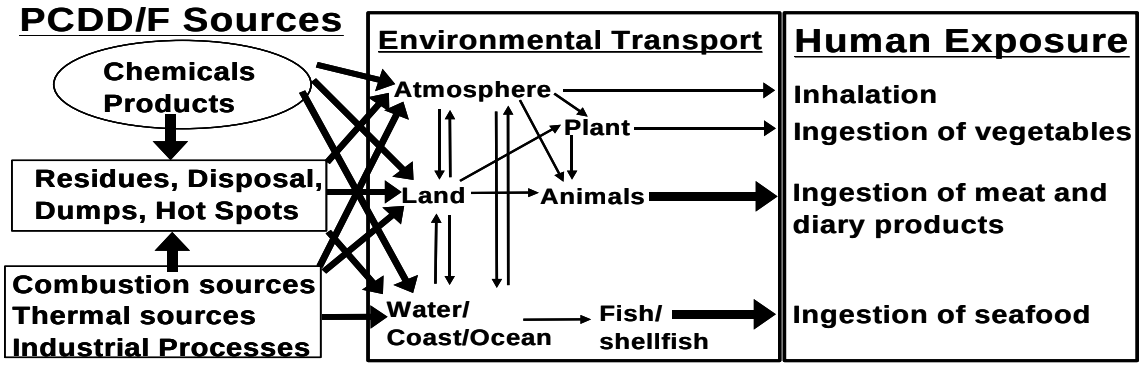

Figure-3 Flow chart of human health risk assessment of pesticides

Exposure to pesticides results in both acute and chronic health problems, which range from short term effects to chronic diseases like cancer, reproductive and developmental disorders etc. (Yassi et al., 2001). An investigation in this line was carried out by Manchini et al. (2005), who looked into the health effects of acute pesticides among the cotton growers of India. Barring few scattered works, there has been very scanty works carried out in India to study the residual effect of pesticides on human health. Intensive research is being carried out in this aspect in China and Japan.

In view of this, specific and more elaborate studies dealing with the agricultural practises of the farmers regarding pesticide use and its health impacts is urgently required to make informed policy decisions to bring about changes in the agricultural practises in India in particular. From most of the works mentioned above, there is no denying the fact that exposure to pesticides causes a range of human health problems. It is estimated that nearly three fourths of deaths due to pesticides occur in developing countries (Horrigan et al. 2002). At present, India is the largest producer of pesticides in Asia and ranks twelfth in the world for the use of pesticides with an annual production of 90,000 tonnes. A vast majority of the population (56.7%) in India are engaged in agriculture and are therefore, exposed to the pesticides used (Gupta, 2004; Government of India, 2001). Pesticides that are being used in agricultural fields disseminate into the environment and come in human contact directly or indirectly.

Epigenetics-

• The study of heritable changes in gene function that occur without a change in the sequence of nuclear DNA. This includes the study of how environmental factors affecting a parent can result in changes in the way genes are expressed in the offspring. The idea has been around since 1942, but only in the last few years has it been observed directly.

DNA methylation (one type of epigenetic change) The Cytosine (C) base of DNA can be specifically modified by the addition of a methyl group (-CH3). This is called DNA methylation. Like DNA itself, the DNA methylation pattern seen in a parent is passed along to their offspring. (Though it's different between males and females). When cells divide, C's that have this modification in the parent cell are modified in the same way in the new cell's DNA. Genes that have been marked by DNA methylation are inactivated, meaning the gene is not transcribed into RNA or expressed as protein. Several human diseases have been tied to mutations in the genes that regulate DNA methylation.

Insecticide Poisoning Symptoms

Pyrethroids

The acute effects resemble veratin intoxication, proceeding from excitation to convulsions to tetanic paralysis, except that pyrethrin cause muscular fibrillation also. Death is caused by respiratory failure. Rat oral LD50 values are 584 to 900 mg/kg; the intraperitoneal LD50 values are 167 to 798 mg/kg. The chief toxic action of pyrethrum in mammals is on the central nervous system. Injury to man from pyrethrum has most frequently resulted from the allergenic properties of the material rather than its direct toxicity. Pyrethrum can cause contact dermatitis. Sometimes the sensitivity is similar to that in pollinosis, including sneezing, serious nasal discharge and nasal stuffiness. Sometimes it can cause asthma, bronchitis and sinusitis.

Organochlorines

Tremor is characteristic of DDT, the onset of poisoning is mild effect that progress only gradually, but continuously, to the point of convulsions. On the contrary, BHC, aldrin, dieldrin, endrin, toxaphene and several other compounds frequently produce illness in which a convulsion is the first sign of injury. DDT and may be other insecticides act by changing the electro-physiological and associated enzymatic properties of nerve cell membranes, especially axonal membranes. Organochlorine insecticides produce little morphological changes even when given in single or repeated doses sufficient to kill. Carcinogenicity of organochlorine insecticides is debatable. Tumor formation in mouse has been detected but there is serious disagreement whether these tumors are malignant.

Organophosphates

Signs and symptoms to organophosphorus insecticide poisoning are secondary to cholinesterase inhibition. The usual symptoms include: headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include: sweating, miosis, tearing, salivation and other excessive respiratory tract secretions, vomiting, cyanosis, papilledema,

uncontrollable muscle twitches followed by muscular weakness, convulsions, coma, loss of reflexes and loss of sphincter control. Cardiac arrhythmias, various degrees of heart block and cardiac arrest may occur.

Carbamates

Broadly speaking, poisoning by carbamates and by organophosphorus compounds is same i.e. inhibition of cholinesterase in brain. Therefore, much of the effects are the same. The most striking differences between the clinical effects of two groups are the relative brevity of poisoning by carbamates and relatively wide separation of the smallest dosage of any carbamate that produces mild illness and the dosage of the same compound necessary to produce death. This is because of the relatively rapid spontaneous reactivation of cholinesterase inhibited by carbamates. Non anticholine- esterase effects of carbamates are alteration of induced cellular and humoral immune responses

DEGRADATION OF PESTICIDE:-

(1)Displacement of halogen by hydrogen.
(2)Displacement of halogen by hydroxyl oxylgenolytic halogen
(3)Halogen remover may occur at on early stage by reductive hydrolytic oxy genolytic elimination of chloro constituent .
(4)Non aeromatic structure are generated that spontaneously lost the halides
(a)Pseudomonas capacia
(b)Flavobacterium species
(c)Fusarium species
(d)Geostrichum candidum
(e)2,4,5 T
(f)Organophopsphate insecticide
(g)3,4-dichloro propionilide
(h)4-methyl phenol

PESTICIDE DEGRADATION PATTERN:-

A wide variety of chemical structure exist hydrocarbon skeleton that bear a variety of substances such as halogen, nitro, amino hydroxyl and others.
(1)Aliphatic C chains are degrade by β-oxidation sequence
(2)Resulting C_2 phragments are further metabolized by tricarboxylic acid cycle
(3) Substances on aeromatic rings are remove partially or completely
(4)Aeromatic ring structure are degraded by dihydroxylation and ring cleavage mechanism
(5)If substances on aeromatic rings are halogen, nitro or sulphonate groups then they are unnatural, so they cause interference in oxygenation and cause of recansitrance.
(6)If substances are methyl, methoxy, carboxyl, carbonyl groups they can be removed from blocking post metabolically
(7)If dyhydroxylation can occur on substituted pathway will be follow with minor modification according to the nature and position of substances
(8)Saturated ring structured are more refractory than the aeromatic analoges they do not support growth of any single micro organism however they may undergo cometabolism
(9)Organic molecule to be degraded becomes more complex if it consist aliphatic , aeromatic , alicyclic, heterocyclic portion together in combination
(10)If the moieties are connected by ester amide or other bond in the molecule than cleavage of such bond by micro organism enzyme is the first step of attack and then subsequent degradation of moieties occur
(11)If such attack cannot occur then degradation will be commonly initiated at the aliphatic end of the molecule
(12)If extensive branching is present at the aliphatic chain end or if certain constituent block the attack here then the attack may be start from aeromatics site
(13)The site and mode of initial attack is determine by molecule structure enzymatic capabilities micro organism and environment condition that prevailed**.**

FACTORS AFFECTING BIO DEGRADATION:-

(1)Structure and resultant solubility
(2)Substituents
(3)Halogen's substituents
(4)Highly chlorinated compounds
(5)Temperature, heavy metal concentration

Existing Laws And Practices -

The federal government as well as Washington State has instituted programs to help decrease the possibility of ground water contamination due to fertilizers and pesticides.

US Environmental Protection Agency has numerous responsibilities including:

• Registering and establishing pesticide usage regulations
• Enforcing pesticide regulation compliance
• Overseeing state programs for training and licensing program for pesticide applicators
• Establishing drinking water and surface water quality standards and monitoring requirements
• Taking enforcement action as appropriate
• Conducting research on health effects and methodology for identifying contaminants
• Providing technical support to federal, state, and local agencies
• Developing public education materials and programs
• Providing financial assistance to states

Federal Insecticide, Fungicide, and Rodenticide Act,

7 USC Section 136 provides direct control over the sale and use of pesticides. All pesticides must be approved by EPA through a mandatory registration process. Products that pose unreasonable risks to human health or the environment can be denied registration, thus preventing their distribution and use. Registration sometimes results in restrictions being placed on the use of certain classes of pesticides. Pesticides are classified either general use or restricted use. Restricted use pesticides must be applied only by certified applicators and may involve additional use restrictions. General use pesticides may be sold without restrictions on who may use them.

Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC Section 9601 (CERCLA).

Known as the "Superfund," the Hazardous Substances Response Fund set up by CERCLA, finances government containment or cleanup responses to actual or threatened releases of substances that may harm human health or the environment, including ground water. The liability provisions authorize EPA to hold polluters liable for the expenses of removal, cleanup, and containment, as well as to force the responsible parties to undertake required actions at their own expense.

The applicability of CERCLA to problems associated with agricultural chemicals is limited. The act contains exemptions which appear to grant substantial immunity from liability under CERCLA to farmers who contaminate ground water. However, application of other provisions of CERCLA to farming operations is not as clear. For example, the CERCLA authorization for EPA to order abatement actions in cases of imminent and substantial threats to health or environment do not contain an exemption for pesticide users.

US Department of Agriculture (USDA).

The Farm Bill of 1990 authorized $80 million over five years for USDA research into how farmers can reduce their dependence on chemicals by changing to low-input, sustainable agriculture. The act requires individuals who use restricted use pesticide to keep records. This law also includes financial assistance to farmers in preventing surface and ground water contamination.

INDIA-

Pesticide and Pest Control Products Act of 1994

This act provide a suitable instrument governing the use of pesticides and pest control products in the country and therefore can provide a tool for executing necessary obligations regarding pesticides; it might need some revisions or updated bylaws to accommodate obligations created by the relevant international conventions.

Administrative arrangements;

1. Administrative arrangements had to be made to provide support for necessary decisions before legal support was put in place.
2. The existing administrative systems had to be empowered and supported with trained and qualified staff as well as necessary facilities;

Access to information, information exchange and coordination;

1. As mentioned earlier many of key provisions of these conventions require good access to information as well as an efficient mechanism of information exchange and quick dissemination of decisions between all relevant stakeholders within the country.
2. Good coordination between all stakeholders and syncronisation of efforts for sound management of chemicals.

The Soil Conservation Service provides technical assistance on soil and water conservation practices directly to users and through local conservation districts; assists in developing farm management plans; provide on-farm technical assistance and support to dairy, livestock, dry land, and irrigated farmers, and works with conservation districts and support districts on their information and education activities. The Agricultural Research Service conducts research on cropping systems, pest and nutrient management, pesticide movement, water and soil management and conducts studies on "minor uses" of pesticides.

International Commitments

Three international conventions are important in pesticides and chemical management; Basel, Rotterdam and Stockholm conventions. These conventions provide life-cycle (integrated) approach to chemicals management.

Basel Convention

The Basel Convention establishes a written prior informed consent (PIC) procedure to control the transboundary movement of hazardous chemicals and wastes. The Convention was adopted in 1989 and entered into force in 1992. As of March 2006, the Convention had 168 contracting Parties. The Convention provides technical support to help countries manage and dispose of such wastes in an environmentally sound manner and to reduce their generation. In the first decade after its entry into force, work under the Convention focused primarily on developing a global system of control on transboundary movements of hazardous wastes and criteria for their environmentally sound management.

The obligations of Parties to the Convention are to report specified information to the Secretariat; build the necessary infrastructure and facilities to identify and dispose of wastes in an environmentally sound manner; minimize waste generation and the export of waste; control waste exports on a shipment-by-shipment basis through the PIC procedure; monitor the effects of hazardous waste management on human health and the environment, develop and use low-waste technologies; and – for those with the means to do it – to assist other countries in developing and strengthening their infrastructure and capacity to manage hazardous wastes.

Rotterdam Convention

The Rotterdam Convention was adopted in September 1998. The objective of the Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade in certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use by facilitating information exchange about their characteristics, by providing a national decision-making process on their import and export, and by disseminating those decisions to Parties.

The Convention was developed based on the voluntary PIC procedure established jointly by FAO and UNEP in 1992. The Convention entered into force in February 2004 and, as of 19 January 2006, the convention had 102 Parties. FAO and UNEP jointly provided the secretariat during the interim PIC procedure and entry into force. The joint Secretariat was developed to benefit from synergies between the work on pesticides in FAO and that on industrial chemicals in UNEP.

The main obligations of the Convention Parties are to notify the Secretariat of their final regulatory actions to ban or severely restrict chemicals; propose severely hazardous pesticide formulations causing problems under the conditions of use in developing countries and countries with economies in transition; provide import decisions for the chemicals listed in Annex III; respect the import decisions of importing Parties for chemicals listed in Annex III; control the export of chemicals that are banned or severely restricted domestically; strengthen national infrastructures and institutions so as to implement the Convention effectively; assist other countries in developing the infrastructure and capacity necessary to manage chemicals and to implement the Convention; promote chemical safety and awareness; and participate in the exchange of information on those chemicals that are banned or severely restricted and also on severely hazardous pesticide formulations.

Stockholm Convention-

The Stockholm Convention aims to protect human health and the environment from POPs and to reduce or eliminate production and use of POPs and releases of POPs from unintentional production and from stockpiles and wastes. The Stockholm Convention was adopted in 2001 in response to calls for global action to reduce the dispersal of these chemicals into the environment, sometimes to places far from their source. It came into force in May 2004 and, as of 31 January 2006, it had 118 contracting Parties. The Convention currently lists 12 chemicals or groups of chemicals. These comprise pesticides, industrial chemicals and unintentionally produced by-products. Eight of these chemicals are also listed in Annex III to the Rotterdam Convention. The Stockholm Convention establishes criteria and procedures for considering the listing of additional chemicals.

The main obligations of the Parties to the Convention are to eliminate or restrict the intentional production, use, import and export of POPs; reduce or eliminate releases of unintentionally produced POPs; reduce or eliminate POPs releases from stockpiles and wastes; report on the measures taken to implement the Convention; provide data on production, import and export of POPs; promote information exchange, awareness and education about the Convention; support research on listed and candidate POPs and their alternatives; support national activities to implement the Convention; and assist other countries in improving their capacity to implement the Convention. Following its third meeting, in 2007, the Conference of the Parties to the Convention will be convened biennially.

RECOMMENDATION-

Toxicology is said to be one of the most neglected area in clinical practice. Two main reasons, responsible for this statement are first being India lacks good referral centers for treatment of poisoning cases. Secondly all poisoning cases are being Medico-legal cases, draws much less interest to the clinicians since they fear of court attendance and moreover less paying, and more time consuming. Due to the risk involved in treatments of pesticide poisoning, there is general agreement that emphasis should be on preventing pesticide illness rather than relying on treatment.

The suggestions are to go for alternative safer measures of pest management, and reduction in reliance on synthetic pesticides. Encouraging biological control and integrated pest management should be the main focus. Cotton leaf curl virus disease, banana

bunchy top virus disease, insect pests of rice, sugarcane planthopper, and pest complex of fruit orchards are causing economic losses. These need to be tackled with utmost care to environmental safety.

It can be concluded that environmental impact assessment is essential before any project is developed and executed. The use of pesticides should be as low as possible, and strongly discouraged. Integrated Pest Management relying upon natural pest control should be popularized.

The lack of education in the female population and the unavailability of trained female practitioners in the rural areas are likely to be the main causes of this disproportionate precautionary measures by gender. It is very important to teach children and young adults basic science in the context of environmental health, so that as they mature, they can make educated decisions concerning, not only how we affect the environment, but how it affects us.

CONCLUSION:-

The use of pesticide kills the natural enemies of this pest or other pests of the same crop. Elimination of the pest also cause death of the natural enemies. In such cases integrated management involves pesticide selectivity between the pest in question and the natural enemies of other potential pest of the same crop so that insecticide control of the key pest does not lead to an upsurge of other pest problems. Farmers should be educated to apply a specific pesticide for a specific pest. For ex. An aphidicide pirimicarb, a systemic and fumigant carbamate which effects aphids and flies but not lady birds. In addition the formulation of spray, reduce dose rate, application in space are other sources by which selectivity of pesticide application can be made. We can apply organic farming for better crop yield.

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