

PESTICIDES AND ECO-TOXICOLOGY

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ABSTRACT

Pesticides are the toxic substances that kill weeds, insect, fungus, rodents, mites (miticides), bacteria, snail, slugs, nematodes (nematicides), resulting control the pest called pesticides. means the word suffix “cide” means to kill the pests. In order to have a better crop, pesticides (like DDT, Malathion, Parathion, Eldrin, Dieldrin etc.) are extensively used in agriculture and farming during crop production. Pesticides are absorbed by all the parts of plants, leaves, stem, and roots. They can't be washed off easily. The food crops which are affected by pesticides are consumed by human beings. Pesticides concentrated in the tissues of organisms due to contamination of environment. Pesticides are sprayed are also eaten by animals and human being, directly and indirectly affected by pesticides. So finally food chain affected in eco-system. Fish and other organisms like birds, bees and mammals population can suffer from exposure to pesticides. The people especially workers farmers who handle pest abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin problem and eyes problems, respiratory problems, endocrine function disrupt. Many studies have examined that suggests some pesticides mimic the structure of hormones, created gene toxic effect, and neurological problem etc. Pesticides have been regulated since a long time, international and national agencies ensure that they meet safety standard to protect human health and environment. There is need to promote organic food farming and reduce the use and exposure to pesticides.

KEYWORDS: DDT, ECD, Eco-toxicology

Eco-toxicology is a multidisciplinary field, which integrates toxicology and ecology (1). Eco-toxicology has been defined as, “ the branch of ecotoxicology concerned with the study of toxic effect caused by natural or synthetic pollutants (2). Eco-toxicology also known as entox is a multidisciplinary field of science concerned with the study of the harmful effect of various chemical, biological and physical agents or living organism (3). Pesticide are used to control organism that are considered to be harmful, they are used to kill weeds (as herbicides), insect (insecticides), algae (algaecides), nematodes (nematicides), mites (miticides), bacteria (bactericides), snails (molluscicides), and birds, (avicides), resulting controlled the pests called pesticide.

Due to an over whelming use of pesticide in India agriculture, chemical residues are found in almost all the food items consumed in India. Foods items such as rice, wheat, vegetable, fruits, spices milk products, meat etc. contain trace amount of one or more of toxic pesticides chemical residue, and create eco-toxic effects in environment (ecosystem).

ROUTE OF EXPOSURE OF PESTICIDES

Pesticides can save farmer's money by preventing crop losses to insects and other pest. One study found that not using pesticides reduced crop yield by about 10%. Application of pesticides is essential for better crop yield, but indiscriminate use is contaminating our

environment. Because they are non biodegradable and remain unchanged, in the soil, even nine feet below. The eco-toxicology that can lead to the presence of toxicants in our food, water and air (4). We are all connected between the communities of living things. Plants can toxics through their roots and leaves (5).

ECO-TOXICOLOGY AND HEALTH EFFECT

The use of pesticides acute toxic for our ecological system. Some 860 pesticides are registered for use in India, as many as 67 pesticides banned in other countries, are being used in India, five popular brands of chemical pesticides- glyphosate, parathion, malathion, diazinon and tetrachlorovinphos-that the research arm of the world health organization (WHO) categorized as probable or possible carcinogenic or widely used in India. Pesticides like DDT, aldrin, dieldrin, malathion, parathion are extremely persistent and accumulate, in fatty tissues, pesticide mimic the structure of hormones and interferes the protein translation show chromosomes aberration means teratogenic effect, gene toxic effect, damaged genes on the DNA molecule then resulting in biochemical abnormalities in the body, pesticides like DDT, malathion and chloropyrifos weaker the immune system. Direct consumption of a toxic or something that has been contaminated with a toxin by breathing eating or drinking (6), as well as affecting the reproduction, nervous and cardiovascular system of any animals exposed (7).

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MATERIALS AND METHODS

Sampling

All samples of water, soil, fruits, & vegetables from different field of Rajnandgaon were collected. All samples were collected in plastic bottles and bags with proper label showing area and date. The samples were acidified with 6N Nitric acid (8 ml/ L) soon after sampling. 20 gm fresh fruits and vegetables were cleaned with tap and double distilled water, 5 gm of soil samples from surface soil were collected from each sampling station.

Chromatography Condition

The insecticides were identified and quantified by a gas chromatography (Perkin Elmer Auto system XL) equipped with an electron capture detector (ECD).

Sample Preparation

Before the extraction process and pre-concentration the sample were made into a concentrate (50% W/V) in distill water. Then fresh sample was centrifuged at 4000 r.p.m. for 15 minutes and, the liquid portion was filtered through a 0.45 μm nylon .After filtration, the sample was diluted with a water methanol mixture (1: 1% V/V) and stirred . The combined extracts were transferred to a separating funnel. The filtrate solution was percolated on cartridge C18 (at a descending flow rate of 2 ml min^{-1}). Elution was performed with 5 ml of ethyl acetate .Then the sample was concentrated to dryness by evaporation under inert conditions at constant flow rate of the N_2 gas . The final residue was dissolved in 1 ml of acetonitrile water (4:1% V/V) at pH 4.1 μl of injection volume was used for the chromatography system.(Table ,1)

RESULTS AND DISCUSSION

Table 1: Sample For Chromatography

SAMPLE	CHLORPYRIPHOS (in ppm)	MALATHION (in ppm)	DDT (in ppm)
Soil s_1	2.75	2.00	1.75
S_2	2.70	1.60	1.36
S_3	1.65	1.52	1.35
S_4	2.03	1.05	1.00
Water S_1	1.65	1.25	1.25
S_2	1.60	1.45	1.30
S_3	1.85	1.30	1.90
S_4	2.30	1.00	1.60
Vegetables Potato	1.25 -1.65	1.20 -1.80	0.49 -0.53
Bringle	1.70 -1.90	0.65 -0.90	0.80 – 1.25
Radish	1.00 -1.50	1.00 -1.45	0.65 -0.90
Fruits Water melon	1.15 -2.52	0.75 – 1.18	-----
Papaya	1.00 – 1.30	-----	0.29 -0.45
Lemon	1.10 – 1.50	-----	-----

The most frequently used detectors for pesticides residues analysis include ECD ,NPD , FPD ,and MSD .However ,it is well known that ECD has been the most used detector in pesticides residue analysis due to its high sensitivity . In particular to halogenated pesticides although all kinds of electron attracting functional groups such as nitro groups and aromatic structure also give a response on this detector

CONCLUSION

Pesticides no doubt help in protecting food supply the concern is about that which may remain on the food consumed .The government should exercise compliance and enforcement activities to make sure producers properly use and apply pesticides and respect established residue limits. A key practice is to follow direction on label that gives instruction for safe and

proper use of pesticides. The comprehensive insight into the effect of chemical into environment requires assessment capillary to toxicology such as the chemical facts in the environment. The recognition that environmentally hazardous chemicals commonly characteristics of persistence potential to bioaccumulation and high toxicity has resulted in the development and use of chemical that lack one or more of these characteristics . Bio pesticides an alternative to chemical pesticides – bio pesticides are living organism or their product or by-product which can be used for the protection of crop from pests. This forming is called organic forming. Consumption of organic food is no doubt beneficially to human and essential need to improve and enhance the quantity of life.

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