P: ISSN No. 0976-8602 RNI No.UPENG/2012/42622 VOL.-V, ISSUE-I, January-2016
E: ISSN No. 2349-9443 Asian Resonance

# Determination of Organo Chlorine Pesticides in Rice

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**Abstract**

Pesticides are chemicals used for killing, repelling and regulating pest to minimize the damage caused to crops. Study investigates the magnitude of contamination of chloropesticides in Rice & which were brought for sales to the consumer in the local markets. Most of the collected samples were found to be contaminated with residues of chloropesticides. The present studies are aimed at measuring the level of chlorinated pesticides in Rice by gas chromatography method.

**Keywords:** Pesticides, Rice, Gas Chromatography.

**Introduction**

Food is an essential for human growth. Growing demand for food as a result of increasing population has lead to a substantial increase in the application of agro chemicals like pesticides & fertilizers resulting in continued contamination of our environment & food[1]. Public concern over pesticide residues has risen over; the past decade to the point where it has become a significant food safety issue [2]**.** The term pesticides includes all of the following; herbicide, insecticide, rodenticide, bacteriocide and sanitizer[3].

Many organo-chlorine compounds have been isolated from natural sources ranging from bacteria to humans[4]. About 120 pesticides are registered for use in India in which choloropesticides are most common. Among the chlorinated pesticides DDT was first which came to the rescue of public health. The production of technical DDT in Indian over 4000 tonnes & the consumption was 9000 tunnes[5]. Very little work on this vital issue of monitoring of OCPs residues in different commodities done in India. A 2014 epidemiological review found association between autism and exposure to certain pesticides, but noted that available evidence was insufficient to conclude that the relationship was causal.[6]

**Organo Chlorine Pesticides**

Organo chlorine pesticides such as DDT, BHC, Aldrin, Dialdrine etc are commonly known as Organo chlorine pesticides. OCPs are composed primarily carbon, hydrogen and chlorine.In mammalian tissue DDT undergone Dihydro chlorination in form of DDE, which on hydrolysis form DDA. High level of DDT and HCH have been reported in human blood, fat and milk samples in India.

**Toxic Effects of Pesticides**

DDT was the first to be banned because it readily accumulated in the animal tissues. A clinico pathological study [7] was conducted in workers engaged in pesticides like DDT & its isomers, observed that these workers were suffering from skin disease. In many developing countries OCPs were widely used to increase food production & control plant disease & cereals, pulse, vegetables etc. for growing population[8]. BHC causes neuro-toxic effect. Lindane is a human carcinogen and dangerous to the nervous system and hormonal system.Malathione decreases phospholipid levels in blood.carbamate causes acute toxicity.

**Determination of Organochlorine in Rice**

The Determination of pesticides residues in food has become an increasing essential requirement for consumer, producers & authorities responsible for food quality[9]. Limited evidence exist for negative outcomes form pesticides exposure including birth defects, fetal death & neurodevelopmental disorder[10]. The present studies are aimed at measuring the level of chlorinated pesticides in Rice. The present report gives a clear picture recording the OCPs residues level in Rice form different location east part of Delhi.

**Collection of Samples**

The samples were collected from the dealers from different markets in different form from different areas and stored in the refrigerator prior to analysis.

**Principle**

Low moisture non fatty samples is blended with 35% water/acetone and filtered. The presence of water is extractant facilitates extraction of residues from dry product and dilute co-extractives. Most non ionic residues are extracted into aq. acetone solution. Residues are transferred from acetone to organic solvent, methylene chloride/petroleum ether by partioning with salt added to the aqueous layer after the first partioning to acid transfer.

**Reagents**

1. Acetone
2. Methylene Chloride
3. petroleum Ether
4. Sodium Chloride
5. 35%water/acetone
6. Standard pesticides such as DDT, BHC, Dieldrin, HCH Alpha, beta and gama.

**Sample Preparation & Extraction of Rice**

50 gm sample with 250 ml of 2:1 mixture of acetone and water was blended for 2 min and filtered with buchner fitted with shark skin whatmann filter paper no 1. Sample extract was placed in 1L separator & treated with 1:1 mixture of methylene chloride & petroleum ether. The organic layer was separated, dried over sodium sulphate and concentrated in a strong vaccum evaparator. The concentrated was diluted with acetone & reconcentrated. The process was repeated twice.

The aqueous layer was treated with sodium chloride & sample was extracted with methaylene chloride, dried over sodium sulphate and concentrated. All the concentrated were mixed and subjected to florisil cleanup method using 1:16 mixture of diethyl ether & pet. Ether as eluate. The sample was concentrated & analysed by gas chromatography method in which 1-2µ L alignot of prepared sample was injected along with the external standard of the analyte of interest.

The chromatogram of sample & standard were compared on the basis of peaks & retention time. Quantity was determined by comparing areas of sample with that of the external standard.

**Following Conditions are Required for Analysis of Organo Chlorine Pesticides Using Gc with Ecd Detector**

Carrier gas --- nitrogen
injector split---15ml/min.
inject temp.---250 c
detector temp.---300 c

**Calculations**

After calibrating the programme, volume of unknown sample was injected GC 5840 takes care to identify the peak and calculate the pesticide injected per micro litre. From this quantity the pesticide residue were calculated by following formula.

Residue in ppm = sample peak area x std.con. x vol. of std. injected x final vol.
std. peak area x wt. of samples x sample vol. injected

**Result & Discussion**

The analysis of 22 rice samples indicated that only 8 samples [36.3%] contains residues of chloropesticides within the range of 0.010 to 0.020 mg/kg.

Table shows that various rice samples are contaminated with different pesticides. It is seen from the table 1 that the concentration of organochlorine pesticides varied from:

**Table**

| Organochlorine Pesticides | No. of Sample | Result Pesticides/ Samples) (Mg/Kg) | Limit |
|---|---|---|---|
| HCH - alpha | 2 | 0.010 | 0.050 |
| HCH - Beta | 2 | 0.010 | 0.050 |
| HCH - gama | 1 | 0.010 | 0.050 |
| BHC | 2 | 0.020 | 0.050 |
| Aldrin | 1 | 0.010 | 0.050 |

**Note**:- HCH – (Hexachloro cyclo hevanl)

Table show that various rice sample are contaminated with different pesticides.

**Conclusion**

The conclusion of the study have been summarized based on the finding of studies conducted, the measure to minimize the social evil of pesticides in food grains have been suggested. Pesticides which are used in large quantity in food articles are the most toxic for human beings. An attempt has been made to discuss regarding implementation of the rule framed under the prevention of food adulteration act. A practical approach consumers & traders. Area where the existing provisions have failed to tackle the problem of adulteration in food articles & steps to be taken to modify the existing provision of the act & rules have been identified.

**Acknowledgement**

The author is greatfull to the competent authority of Central A E S Food Laboratory Noida for providing laboratory facility & guidance.

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