Identification of Fenvalerate and Methyl Parathion Pesticide residues in Marine products of Pondicherry Region

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Abstract:

After green revolution the use of pesticides increased very rapidly in the cultivation of all kinds of crops like food grains, vegetables, fruits, cotton etc. In Monsoon season after raining the sprayed pesticides are contaminating the lakes and canals. The marine products which are collected from such lakes and canals directly show impact on human health. This study was conducted to identify Methyl Parathion and Fenvalerate residues in marine products collected from Pondicherry region.

Keywords: Pesticide residues, Methyl Parathion, Fenvalerate, Marine products, Pondicherry.

Introduction:

Pesticides are used on fruits, vegetables, wheat, rice, olives and canola pressed into oil and on non-food crops such as cotton, grass and flowers. The OP pesticides Methyl Parathion and Fenvalerate are commonly used on all fruits, vegetables, and wheat. Although Pesticides are used on crops that are fed to animals, residual forms of them are generally not found in meat or dairy products. The most common way that infants, children and adults are exposed to pesticides is by taking them on as food. Workers in agriculture and occupational settings touch and breathe in pesticides, putting them at risk for acute and chronic poisoning. Most studies of the health effects of pesticides have focused on occupationally exposed people, like farm workers and pesticide applicators. Acute OP pesticide poisonings result in symptoms like nausea, abdominal cramps, diarrhea, dizziness, anxiety and confusion, which can be quite severe but are often reversible. There have also been many studies on groups of people who work with pesticides but who have not experienced acute poisonings serious enough to result in these kinds of symptoms. These studies have found that chronic, lower dose exposure is associated with respiratory problems, memory disorders, skin conditions, depression, miscarriage, birth defects, cancer and neurological conditions such as Parkinson's disease etc. There have been fewer studies of people without known occupational exposures, but one study with a nationally representative sample showed increasing odds of ADD/ADHD for 8-15 year olds with increasing levels of OP pesticide metabolites in urine. This research study conducted for the identification of Pesticide residues in marine products.

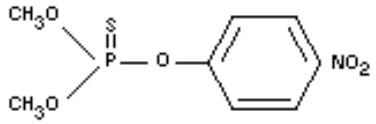

Figure. 1 Structure of Methyl Parathion

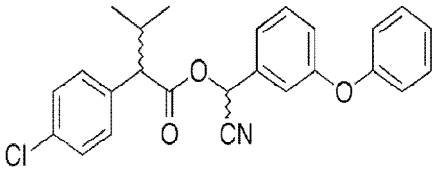

Figure. 2 Structure of Fenvalerate

Material and Methods:

Instrumentation: For quantitative estimation of Fenvalerate, Methyl Parathion in marine samples an isocratic peak hplc instrument with chromosil c18, column, (100 mm x 4.6 mm, 5µ) (250 mm x 4.6 mm, 5µ), (150 mm x 4.6 mm, 5µ) was used. The instrument is equipped with a LC 20AT pump for solvent delivery and variable wavelength programmable UV-Visible detector, SPD-10AVP. A 20µL Hamilton syringe was used for injecting the samples. Data was analyzed by using PEAK software. techcomp UV 2301UV-Visible spectrophotometer (Hitach software) was used for spectral studies. Degassing of the mobile phase was done by using a Loba ultrasonic bath sonicator. A Denver balance was used for weighing of the materials.

Sample collection: The fish, crab and Prawn samples are collected from Pondicherry region mainly nearby Paddy cropping area.

Extraction of pesticides from Marine sample [17]

20 g of sample was kept into a cone flask and thoroughly mixed with dichloromethane (30 ml) and sodium carbonate (15 g). Then the mixture was kept undisturbed for 12 Hours in the well-sealed cone flask. After that the mixture was filtered through filter paper and then the tundish was washed with dichloromethane. The filtered liquid phase was contained in an open petry dish. When dichloromethane was dried out, methanol (5 ml) was added to extract the DDVP. The extraction was repeated twice with methanol (2 ml). These extractions were mixed and diluted by methanol to 10 ml then filtered for analysis.

HPLC Conditions for Analysis of Methyl Parathion [18]

For analysis of Methyl Parathion in tissue samples, HPLC with UV-detector set at 225 nm was used, with low sensitivity and specificity. In this study C18 reversed phase Chromosil column was employed at 25C temperature with a mobile phase composed of Water and methanol (*p*H 5.3) in 65:35 v/v ratio. The isocratic elution under the condition employed allows the separation of Methyl Parathion. Good separation and peak shape was obtained at a flow rate of 1.0 ml/min.

S.No	Condition	Parameter
1	Mobile Phase	Water and Methanol 65:35 (v/v)
2	Column	Chromosil, C18 (4.6 mm, 100 mm) column
3	Wave length	225 nm
4	Flow rate	1.0 ml/Min
5	Column temperature	25 C
6	Run time	10 min
7	Sample volume	20 µL
8	P^H	5.3

Table.1 Chromatographic conditions of Methyl Parathion

HPLC Conditions for Analysis of Fenvalerate: [19]

For the analysis of Fenvalerate in tissue samples, HPLC with UV-detector set at 239 nm was used, with low sensitivity and specificity. In this study C18 reversed phase GEMINI column was employed at 30C temperature, Acetonitrile: Methanol: KH_2PO_4 (50:40:10 V/V/V) P^H 6.8 as the mobile phase. The isocratic

elution under the condition employed allows the separation of Fenvalerate, Good separation and peak shape was obtained at flow rate of 1.0 ml/min.

S.No	Condition	Parameter
1	Mobile Phase	Acetonitrile: methanol-potassium dihydrogenate phosphate (50:40:10)
2	Column	GEMINI C18, 250 mm×4.6 µm
3	Wave length	239 nm
4	Flow rate	1.0 Ml/Min
5	Column temperature	30 C
6	Run time	10 min
7	Sample volume	20 µL
8	P^H	6.8

Table.2 Chromatographic conditions of Fenvalerate

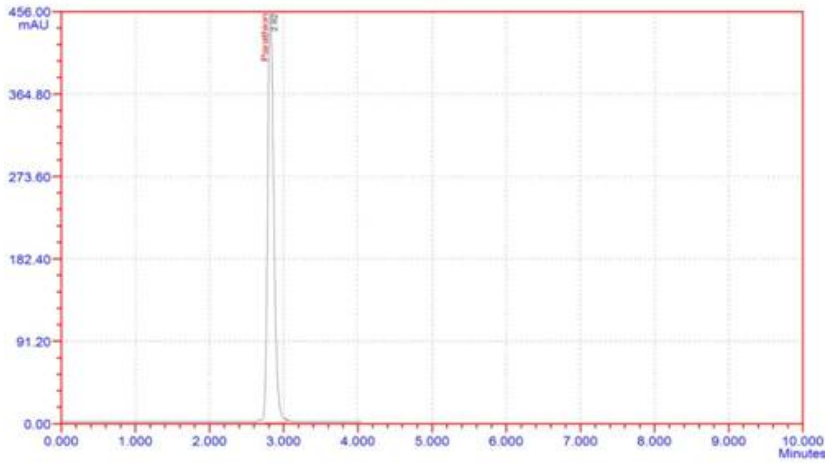

Figure: 3.C HPLC Chromatogram for Methyl Parathion

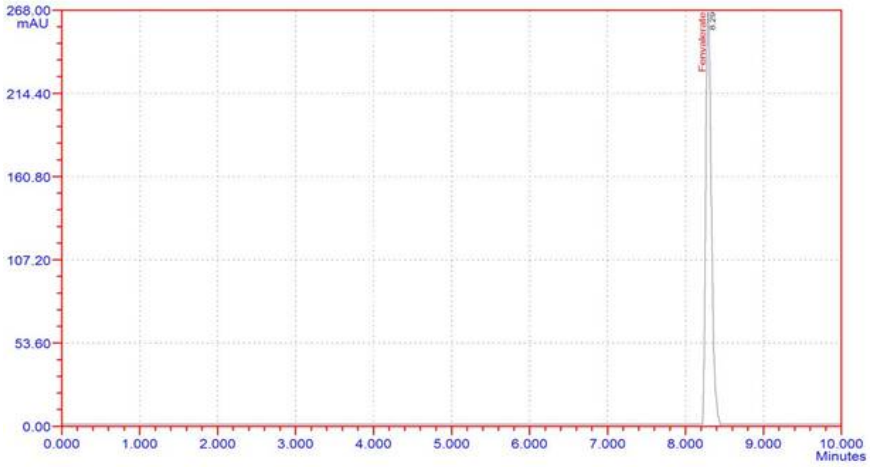

Figure: 4 HPLC Chromatogram of Fenvalerate

Results:

S.No.	Location of Sample collection	Fruit sample	Concentration of Methyl Parathion µg/Kg	Concentration Fenvalerate, µg/Kg
1	Velram pet	Fish	12.6± 0.21	6.55 ± 0.75
2	Mogamigai Nagar	Fish	14.2± 0.45	5.93 ± 0.96
3	Kaakaayanthope	Fish	7.52 ± 0.43	6.44 ± 0.34
4	Velram pet	Crab	7.63 ± 0.27	5.82 ± 0.75
5	Mogamigai Nagar	Crab	6.28 ± 0.76	5.36 ± 0.62
6	Kaakaayanthope	Crab	10.63 ± 0.42	8. 35 ± 0.0
7	Velram pet	Prawn	10.55 ± 0.32	8.26 ± 0.54
8	Mogamigai Nagar	Prawn	9.23 ± 0.63	8.00 ± 0.72
9	Kaakaayanthope	Prawn	7.66 ± 0.35	7.52 ± 0.11

Table.3 Concentrations of Methyl Parathion and Fenvalerate in marine samples.

Discussion:

In this study, it was found that Methyl Parathion and Fenvalerate are present in all three types of marine food samples. All samples have these pesticidal residues in more than (Minimum residual Level)MRL values. Comparatively Methyl Parathion was found to be more in concentration than Fenvalerate.

The Fish samples of Velram pet is having high amounts of methyl Parathion and it is prawn in case of Fenvalerate. Mogamigai Nagar samples of Fish is with relatively high concentration of Methyl Parathion than in crabs and prawns. Fenvalerate concentration is relatively high in Prawn of the area. The crab samples 0f Kaakaayanthope location is with effecting levels of Methyl Parathion and Fenvalerate residues.

Taking these marine products regularly as diet may effect our health undoubtedly. To avoid this type of issues farmers should take proper care such that they may not enter into the nearest waters and may contaminate after using pesticides to crops. They should make separate canals for stagnant water out flow.

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