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Pesticide Contamination in some lakes of Rajasthan

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Abstract: *Beawar is situated at a distance of 50 km south west of Ajmer district. This town accommodates a number of freshwater bodies in which are Jalia/Phool sagar and Bicherli . Jalia pond is selected for studies. Jalia pond is natural and perennial pond of shallow fresh water, located on the bank of irrigation pond called Jalia (Phool sagar) .Jalia pond is situated between 7 villages. Initially the water of pond was clean and used for drinking purposes, irrigation and other domestic use. These days the water of pond is not used for drinking purpose but is used for bathing, washing, irrigation, sewage discharge and waste thrown by people which disturb the ecobalance of the pond . A large area of catchment is used for agriculture and for vegetable crops. Such activities lead to input of agrochemicals particularly pesticides.The water quality of lake was studied for assessing input of pesticides. The study reveals that water is with synthetic pesticides. The concentration of pesticides were higher in summer than in rainy season. Efforts are needed conserve the wetlands and impact of agrochemical on lake ecosystem.*

Keywords: *Pesticide contamination, jalia pond , Beawar.*

I. Introduction

Beawar is situated at a distance of 50 km south west of Ajmer district. This town accommodates a number of freshwater bodies in which are Jalia/Phool sagar and Bicherli . Jalia pond is selected for studies. Jalia pond is natural and perennial pond of shallow fresh water, located on the bank of irrigation pond called Jalia (Phool sagar) . Jalia pond is situated between 7 villages. Initially the water of pond was clean and used for drinking purposes, irrigation and other domestic use. These days the water of pond is not used for drinking purpose but is used for bathing, washing, irrigation, sewage discharge and waste thrown by people which disturb the ecobalance of the pond . Beawar is located on high ground in the central Aravali region at an average altitude of 446m above the mean sea level at the main railway station. It lies 26 ^{0} 6 ‘ N latitude & 74 ^{0} 19’ E longitude. National Highway no. 8 is passing through this town Which links the town with Jaipur and Udaipur.

II. Materials And Methods

Sampling was done for 1 year starting from September2012- August 2013. Five sampling sites were selected within the lake for collection of water samples. The samples were from .3 m below the surface in amber colored 1 l bottle that has been rinsed with ethyl acetate and were heated at 250 ^{0} C (4 hours) before use. The samples were stored at 4 ^{0} C and analyzed with in a weeks time. Important characteristics of different selected sites are outlined in Table 1 .

Gas Liquid Chromatography

The residue of Organo-chlorine pesticides were analyzed using a Chemito-Gas-Chromatograph
(Model-8610) with 63 Ni ECD (Electron Capture Detector). Aliquots of 5 µ extract were injected into a capillary column (BPX 608). During the isotherm run, column , injector and detector temperature were maintained as per following details;

Column informations ECD informations
BPX 608 Temperature 300 ^{0} C

Column max temp 370 ^{0} C Sampling rate 40m/sec.
Length 25.0 m Current 1nA.
Inner Diameter 0.32mm ID
Film Thickness 0.46M

Column Oven Temp Programming

S.No.	Rate	Temperature	Hold time
1	-	160	1.0
2	3.00	260	5.0
3	00	0.00	0.00
Total prog time 39.33 min.			

Formula for calculation

Oesticide Residue =Parea of sample x Concentration of Standerds x Final vol of extract/
Peak area of standard x Vol of sample injected x weight of sample.

III. Results And Discussions

A total 50 samples were collected from 5 different locations and analyzed for organo-chlorine pesticide residues viz. Heptachlor, pp DDT, ppDDE, ppDDD, β-HCH and Aldrin. The average concentration of different organo-chloride residues in samples analyzed. The results are shown in table 1 . The results show that residues of pesticides were found to be significantly high.

Aldrin

The aldrin conc. In the lake was reported in the range of .0041-.0257ppm.
The average value of this organo chlorine pesticide was analyzed to be .0149ppm, which is well under the permissible limit of FAO/WHO (1986). The average concentration of organo chlorine pesticide in various samples collected from different sites are shown in table 2. The permissible limits for various organo-chlorine Pesticides of FAO/WHO(1986) are shown in table 3. Some pesticides may cause health related disorders, when they are exposed to human beings (Kamrin 1997).
Symptoms of pesticide poisoning are outlined in table 4.

β- HCN

The concentration of β-HCN in the lake was varied from 0.115-1.163 ppm .
The higher concentration of β-HCN may be correlated with its easy availability in the market.

DDT

The pp-DDT value varied from .025-.0551 ppm and its average value was .04005ppm, while its metabolites ie. pp DDD and pp DDE were reported with range from .0101-.0480 ppm and .005-.0351ppm, respectively. Due to low cost of DDT and its high efficacy, it became a prime choice of farmers and cultivators in Rajasthan. Although it was banned by the Government, lack of awareness among public . DDT and its metabolites are possessing long half life (4-10 years) so it is still present in the environment.

Heptachlor

The average concentration of Heptachlor in various samples was .032316ppm and the range was between.003-.067ppm.

Table2 pesticides ppm

Pesticide	September	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Aldrin	0.0050	0.0068	0.0108	0.0128	0.0170	0.0192	0.0220
βHCN	0.130	0.130	0.138	0.136	0.142	0.150	0.150
ppDDD	0.0100	0.0110	0.0110	0.0120	0.0210	0.0286	0.0290
ppDDE	0.004	0.006	0.016	0.0190	0.0230	0.0292	0.0310
ppDDT	0.020	0.0262	0.0292	0.0310	0.0340	0.0400	0.0480
Heptachlor	0.008	0.016	0.020	0.02	0.022	0.032	0.032

Pesticide	Apr.	May	June	July	Aug.	average	
Aldrin	0.0260	0.0260	0.0262	0.0201	0.0072	.01659	
βHCN	0.160	0.170	0.172	0.130	0.120	0.13266	
ppDDD	0.0360	0.0490	0.0482	0.0210	0.0101	0.0239	
ppDDE	0.0382	0.0352	0.0360	0.00301	0.012	0.0195	
ppDDT	0.0532	0.0560	0.0552	0.0492	0.0280	0.039	
Heptachlor	0.042	0.052	0.062	0.040	0.004	0.029	

Table 3. FAO/WHO permissible limits of some pesticides

S.No.	Organo-chlorine pesticide	Limit in ppm	ADI mg/kg body weight	Persistance of pesticide(Approximate time for 70-90% loss)	Present Status in India
1.	Heptachlor	Upto .50	-	3-6 years	Banned
2	DDT	1.0	0.0020	4-10 years	Banned
3.	Aldrin	.11	0.0010	2-3 years	Banned
4.	B HCN	-	0.0010	2-3 years	Banned

Table 4. Pesticide poisoning and its common symptoms on different systems of Human body.

S.No.	Category	System affected	Common Symptoms
1.	Neurological disorders	Brain, Spinal cord Nervous System	Head-ach,confusion,change in behavior,dizziness,convulsions,depression,coma.
2.	Dermatological disorders	Skin,eyes.	Redness,swelling,rashes,itching,irritation.
3. .	Renal disordres	Kidney Disorders	Back pain,Urinating more or less than usual.
4.	Gastrointestinal disorders	Disorders related to stomach and intestine.	Vomoting,diarrhea,nausea.
5	Hematological disorders	Blood	Anemia
6.	Reproductive disorders	Ovaries, testes, fetus.	Infertility, miscarriage.
7.	Respiratory	Nose,lungs,trachia	Tight chest, irritation in respiratory tract, coughing, cchocking of nostrils and bronchus.

IV. Conclusion And Summary

The study reveals that the Organo chlorine pesticides residues were in higher conc. As HCH, ppDDD, ppDDE, ppDDT, Aldrin and Heptachlor. The conc. Of these pesticides became high in peak summer due to high temperature, low quantity of water. In rainy season, rains feed components of lake fluctuates with the changing conc. Of pesticides. Periodic monitoring of such persistant pesticides should be to obtaininformation on env. Quality of lakes.

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