Resent Observations on the Physiochemical Parameters and Organochlorine Pesticides Residues of Water from Asola Dam, Manora (M.S.)

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Abstract

Assessment of physico-chemical parameters and pesticide residues were carried out during April 2013 to March 2014 from Asola dam, in Manora Tehasil, Dist Washim which is located in Maharashtra state of India .Seasonal variations at four different sites of the dam were observed. Sites I, II, III and IV were subjected to various anthropogenic activities of man. Maxima of TDS, conductivity, pH, were recorded during rainy season while maxima of salinity were observed during summer from the dam indicating degradation of water quality during rainy season than summer. The results indicated that most of the physico-chemical parameters from Asola dam were within the WHO limits and the organochlorine pesticide residue studied are very low and also in the permissible limit. Thus the water from Asola dam is suiTable for Agricultural, domestic purposes and drinking purpose after some process.

Keywords: Physico-chemical parameters, Pesticides, Asola dam Manora.

Introduction

People have contradictory ideas about the meaning of pesticides. The dictionary defines pesticide as a sub- stance for destroying harmful insects. The scientists are of the opinion that pesticides are chemical or biological substances that are designed to kill or retard the growth of pests interfering with the growth of crops, shrubs, trees, timber and other vegetation desired by humans. The term pesticide includes substances intended for use as plant growth regulators, defoliants, desiccants or agents for thinning fruit or preventing the premature fall of fruit. The substances applied to crops either before or after harvest to protect the commodity from deterioration dur- ing storage and transport also come under the category of pesticides [1].

Pesticides are broadly classified into two groups viz. A) chemical pesticides and B) biopesticides. A) Chemical pesticides are conventionally synthetic materials that di- rectly kill or inactivate the pest. They are classified ac- cording to the type of organisms they act against as for example 1) insecticides, 2) herbicides, 3) fungicides, 4) rodenticide, 5) nematicides . Insecticides include or-ganophosphates (TEPP, parathion. trimesters of phos- phates and phosphoric acids), carbamates (aldicarb), organochlorines (dichlorodiphenyltrichloroethane, chlor- dane, aldrin, dielrin, lindane, endrin) and botanical insec- ticides

(nicotine, rotenoids, pyrethrum). Herbicides are used to destroy other weeds that interfere with production of the desired crop. Based on their structure they are grouped into chlorophenoxy compounds (e.g.: 2,4-D, 2, 4,5-T), dinotrophenols like 2-methyl-4,6-dinitrophenol (DNOC), bipyridyl compounds like paraquot, carbamate herbicides, substituted urea, triazines and amide herbicides like alanine derivatives. Fungicides include a number of structurally different chemicals like cap tan, folpet, pentachlorophenolziram, nambam etc. Fungicides con-taining mercury is known to cause nerve disorders [2].

Pesticides (herbicides, fungicides, insecticides) are widely used in the agriculture and industry around the world due to their high insecticidal activity. The presence of pesticide residues and metabolites in food, water and soil currently represents one of the major issues for environmental chemistry. Pesticides are, in fact, among the most important environmental pollutants because of their increasing use in agriculture [3]. The toxicity of pesticides to target and non-target organisms generally depends on the amount present in the environment, the proportion available to the biota and ultimately in the amount actually encountered and absorbed by the organism [4]. Environmental distribution may lead to exposure of living organisms including man that are far removed from intended targets. Researchers have detected pesticides residues in heptachlor, endosulfane, Aldane, DDT and PCBs. Many of these pesticides have also been detected in sediment, aquatic plants and fish [5].

Material and Methods

Water samples were taken from 0.3 m below the surface with a pre-cleaned glass bottle. For sampling turbulent midstream position of water bodies were chosen to approximate mean concentration of river water. All foreign bodies were removed and the samples were stored in ice during transport and were kept at 4^0 C in the laboratory until the solid phase extraction.

Sample extraction

The procedure applied for the extraction of pesticides was similar to those reported by Laabs *et al* [6] and Steinwandter [7]. Water samples were extracted using ultrasonic extraction. Sox let extraction was done with 20 ml of hexane: dichloromethane (3:1) for 30 min. The extract was concentrated with the aid of rotator evaporator. Pre-elution was carried out with the HPLC methanol. The concentration solvent extract was then analyzed for Pesticides.

The solvent of the mobile phase of the HPLC is methanol and water (1:1). This was prepared by measuring 250ml of HPLC grade methanol into a 500ml flask and made up with 250ml of distilled water. The HPLC model CECIL 1010 was switched on. The wavelength of the system was determined by using UV visible equipment. Little quantity of stock solution was diluted with methanol and its wavelength determined nu scanning. A peak of 202nm was reached. The system wavelength was then set at 202nm and the sensitivity of the 0.05 nm of the UV detector component set. The flow rate was set at 1ml/min,

afterwards, the purging of the system commenced by allowing the system to run for some time. The purging was carried out through a washing solution of 30% methanol, 70% water. Bubbling helium gas into the solution carried out degassing of the mobile phase was then set up and connected with HPLC system and allowed to run through the system of 20min.

Each sample residues was dissolved in 1ml methanol. The extracted residues was the loaded and injected into the valve of the chromatography system. The resulting chromatograph for each sample was printed out. The various retentions time noted, concentration determined and recorded.

Result and Discussion

Asola dam is in Manora Tehasil, Dist Washim which is located in Maharashtra state of India. This dam is totally surrounded by farm land. Farmer's of this region uses different fertilizers as well as pesticides to control the growth and population of pest for the well growth of crops which is very useful source of their economy and food. These pesticides can enter the reservoir through running waters and subterranean canals.These factors may lead to the contamination of Asola dam.

Table 1: Levels of organochlorine pesticides in water samples of Asola dam.

	DDT				DDE				Endosulfan				Lindane				Heptachlor			
Pesticides Station	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Rainy Season (2014)	.06	.07	.05	.06	.04	.04	.05	.06	.03	.03	.04	.05	ND	ND	ND	ND	ND	ND	ND	ND
Summer Season (2014)	.04	.03	.02	.03	.02	.01	.03	.02	.01	.01	.01	.02	ND	ND	.02	ND	ND	.01	ND	ND
Average mean	.05	.05	.04	.05	.03	.03	.04	.04	.02	.02	.03	.03	-	-	.01		-	.01	-	-
Standard deviation	.01	.02	.01	.01	.01	.01	.01	.02	.01	.01	.01	.02	-	-	-		-	-	-	-
Range	.01-.06	.02-.07	.01-.05	.01-.06	.01-.04	.01-.04	.01-.05	.02-.06	.01-.03	.01-.03	.01-.04	.02-.05	-	-	-		-	-	-	-

During the analysis of water we checked the some organochlorine pesticides and physiochemical parameters of Asola dam.Table 1. is the result of organochlorine pesticides in water of Asola dam. The associated figure for mean concentration for pesticide DDT was in the range of 0.01-0.06 µg/L. The pesticides Lindane and heptachlor was not detected in the water samples in all site but it observe in some site in different season mentioned in Table 1. It is showing that the farmers around the dam do not use them in large in their farming activities. Endosulfan, a broad spectrum contact insecticide and acaricide, is another pesticide used by many farmers. The associated figure for mean concentration of Endosulfan was in the range of 0.01-0.05µg/L.

During this analysis we checked the some water parameters and the result of this is shown in the Table no. 2. We checked the pH, Conductance, TDS, Salinity and DO of the water of Asola dam in two seasons from four different sites. In rainy season TDS of the water is maximum, which is 590 mg/L. pH is the measure of the concentration of hydrogen ions, which provides the range of the acidity or alkalinity of a solution. During the study period the average value of pH for summer season was found to be 7.92 and for rainy season 8.25 which is higher than summer season and Conductance was also recorded highest, and which is 0.61 M mhos in rainy season. In summer the parameter have low values than rainy season except salinity and temperature. Highest Salinity 0.4ppt was observed in summer season and highest Temperature was 23.4^{0}C. Dissolved oxygen content indicates the health and ability of water body to purity itself through biochemical processes. Oxygen is also needed for many chemical reactions that are important to lake functioning, such as oxidation of metals, decomposition of dead and decaying matters etc. During the study period average dissolved oxygen recorded in summer season was 8.4 mg/L and in rainyr season 8.5mg/L.

Table 2: Physicochemical properties of water sample of Asola dam.

Sites	**PH**		**TDS (mg/L)**		**Conductance (M mhos)**		**Salinity (ppt)**		**DO (mg/L)**		**Temperature (^{0}C)**	
	S*	**R***	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**
I	7.5	8.1	350	400	0.4	0.6	0.2	0.1	8.8	8.7	22.3	20.5
II	7.2	8.6	320	480	0.2	0.2	0.1	0.2	8.5	8.9	23.4	21.6
III	7.9	8.1	356	500	0.4	0.5	0.4	0.2	8.1	8.2	23.5	21.3
IV	7.2	7.9	402	590	0.2	0.3	0.3	0.1	8.2	8.4	22.5	21.5
Average	7.45	8.25	357	493	0.3	0.4	0.2	0.1	8.4	8.5	22.92	21.22

S* for summer season and R* for rainy seasion.

Conclusion

The analysis of water quality parameters of Asola dam reservoir showed that the values are well within the permissible limits. The result of study reveals that the quality of dam water is though fit for domestic, irrigation purpose and also for drinking purpose after some treatment and need continuous monitoring of physico -chemical parameters to improve the quality of water.

References

[1]. “International Code of Conduct on the Distribution and Use of Pesticides,” Hundred and Twenty-Third Session of the FAO Council, November 2002.

[2]. B. K. Sharma, “Environmental Chemistry,” Goel Pub- lication House, New Delhi, India, 2006.

[3]. Gamal A. E. Mostafa, 2010. Electrochemical Biosensors for the Detection of Pesticides. The Open Electrochemistry Journal, (2), 22-42.

[4]. Mark. B. and B. Erik, 1996. Pesticide uptake and locomotor behavior in the wood louse: An Experimental study employing video tracking and 14C-Labelling. Ecotoxicology, 5(1): 35-45.

[5]. Osibango, O., C. Biney, D. Calamari, N. Kaba, I.L. Mbone, H. Naeve, P.B.O. Ochumba and M.A.H. Saad, 1994. Chlorinated Hydrocarbon Substances. In: Calmari, D. and H. Naeve (Eds.), Review of pollution in the African Aquatic Enviornment, CIFA Techical Paper No. 25. FAO, Rome, pp: 61-62, ISBN; 92-5-103577-6.

[6]. Laabs, V., W. Amelung and W. Zeach, 1999. Multiresidue analysis of corn and soybean pesticides in Brazilian oxisols using gas chromatography and mass selective detection. J. Environ. Qual., 28(6).

[7]. Steinwandter, H., 1909. Contribution to the online method of extraction and isolation of pesticide residues and environmental chemicals II. Miniaturization of the online method. Fresen. J. Anal. Chemicals, 336(1): 8-11.