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Pesticides persistence in Byramangala and Mulbagal lake

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Abstract
Environmental contamination due to persistence of pesticide residues is gaining worldwide attention. Exposure to pesticide residues can represent a potential risk to any organisms. The residue level of pesticides were quantified in 2 lakes during the year 2017, water samples from the Byramangala and Mulbagal lake region of Southern India. Samples were extracted for pesticide preparation prior to analysis with Gas Chromatography. A total of 17 Organochlorine pesticides were examined. The experimental results revealed that, isomers of Alpha HCH & 4,4-DDD and Endrin Aldelyde of Byramangala lake were detected and doesn't find pesticide residues from Mulbagal lake. Detection of pesticide residues shows serious threat to the ecosystem. Thus, water bodies in the vicinity of the Byramangala lake need to be paid much attention.

Keywords: pesticides, Bhyramangala, Mulbagal, lake

Introduction
Growing demand for food as a result of increasing population has led to substantial rise in the production and utilization of a wide variety of pesticides in agriculture [1]. Extensive use of these chemicals has given rise to several short-term and long-term adverse effects. It has been observed that, their long-term, low-dose exposure increasingly link to human health effects such as immune-suppression, hormone disruption, diminished intelligence, reproductive abnormalities and cancer [2]. Organochlorine are often distributed heterogeneously in the environment and hence, exposure likely spatially explicit [3]. Organochlorine compounds such as PCBs, DDTs and HCH are among the most widely known class of contaminants, because of their ubiquity, potential for magnification in the food chain and harmful biological effects [4]. The constant usage of pesticides leads to a continued contamination of the environment including water resources [5, 6, 7, 8]. Organochlorine pesticides are still used extensively in India due to their effectiveness and low cost [9, 10]. The water supplies of several Indian cities as well as the ground water in rural areas have been contaminated with high levels of pesticides, mainly the organochlorines [11, 12]. Organochlorine pesticides are known to resist degradation and therefore can be redistributed through the food chain and produce significant contamination at the apex of the food chain [13]. No work has been directed towards the contamination of persistent pesticides in Byramangala lake. Thus, the present study aims to identification and quantification of organochlorine compounds in Byramangala and Mulbagal lake water samples in the Karnataka state of southern India.

Background of the Study Area
Byramangala Lake situated in Ramanagara district was originally constructed by the British in the year 1942 in view of providing the local residents with clean water for irrigation, domestic use, fisheries etc. the quality of the lake has drastically changed over the years. The main sources of pollution are the industrial effluents, the municipal effluents and the untreated sewage discharge from the Bangalore urban area, which eventually enters the Vrishabhavathi reservoir. Bidadi industrial area on the right bank, agricultural fields on the left bank. Mulbagal is one of the most important lake situated in Kolara district in the State of Karnataka. Mulabagilu is located at 13.17°N 78.4°E. It has an average elevation of 826 metres.

Materials and Methods
Sampling stations were selected, keeping in view, the important industrial waste discharge zones and nature of domestic activities and agricultural run-off. For the analysis of pesticide residues, water samples were collected in one liter amber colored bottles from Byramangala lake and Mulbagal lake accordingly and transferred the samples into a separating funnel. Sodium sulphate (10 g) was added to the separating funnel and shaken well. The water-sodium sulphate mixture was extracted with dichloromethane (3x100 ml). After each separation, the upper organic layer was collected in a separate beaker and the lower aqueous layer was again extracted with 100 ml of dichloromethane. The combined dichloromethane layers were reduced in volume on a rotary evaporator to about 5 ml. The crude extracts were cleaned up by florisil column chromatography. Glass columns were packed from the bottom with a glass wool plug, 8 cm of deactivated florisil and 4 cm anhydrous Na_2SO_4 to remove excess oil and fat and moisture content respectively. The packed column was pre-washed with 50 ml of petroleum ether. The extract was transferred to the column and eluted with 200 ml petroleum ether, mixed with diethyl ether (85:15). The combined extracts were evaporated almost to dryness and the final volume reached to 5 ml with GC grade solvent as described in APHA [14] standard methods and the water extracts were subjected to GC analysis. The extracts were transformed to the column eluted with 160 ml

petroleum ether mixed with diethyl ether. The combined extracts were evaporated almost to dryness and the final volume of 5 ml was obtained with GC grade solvents. The identification and quantification of compounds were carried out using a Gas Chromatography (Chemito GC 1000), with Electron Capture Detector. GC column employed were capillary column, DB-1701 and DB-5. Pure analytical grade pesticide standards were used for GC analysis as reference standards. The temperature programs of GC were: injector 230° C, column 220°C and detector 260° C. Ultra pure nitrogen gas was used as carrier gas. Winchrome 1000 chromatography data processor was used to record the chromatograms and peak areas were used to calculate the pesticide residues in the samples. These compounds were identified as individually resolved peaks based on retention times, in comparison with the corresponding peak height of the standards.

Results and Discussion

Table 1: Pesticide residue concentrations of water samples of Byramangala Lake

Name of the Pesticides		Result
Alpha-HCH	PPb	1.18
Gamma-HCH	PPb	Absent
Heptachlore	PPb	Absent
Aldrin	PPb	Absent
Beta-HCH	PPb	Absent
Delta-HCH	PPb	Absent
Heptachlor. epoxide	PPb	Absent
Endosulphan-1	PPb	Absent
4,4-DDE	PPb	Absent
Dieldrin	PPb	Absent
Endrin	PPb	Absent
Endosulphan -11	PPb	Absent
4,4-DDD	PPb	4.01
4,4-DDT	PPb	Absent
Endrin Aldelyde	PPb	5.08
Endosulfan Sulfate	PPb	Absent
Methoxychlor	PPb	Absent

Table 2: Pesticide residue concentrations of water samples of Mulbagal Lake

Name of the Pesticides	Unit	Result
Alpha-HCH	PPb	Absent
Gamma-HCH	PPb	Absent
Heptachlore	PPb	Absent
Aldrin	PPb	Absent
Beta-HCH	PPb	Absent
Delta-HCH	PPb	Absent
Heptachlor. epoxide	PPb	Absent
Endosulphan-1	PPb	Absent
4,4-DDE	PPb	Absent
Dieldrin	PPb	Absent
Endrin	PPb	Absent
Endosulphan -11	PPb	Absent
4,4-DDD	PPb	Absent
4,4-DDT	PPb	Absent
Endrin Aldelyde	PPb	Absent
Endosulfan Sulfate	PPb	Absent
Methoxychlor	PPb	Absent

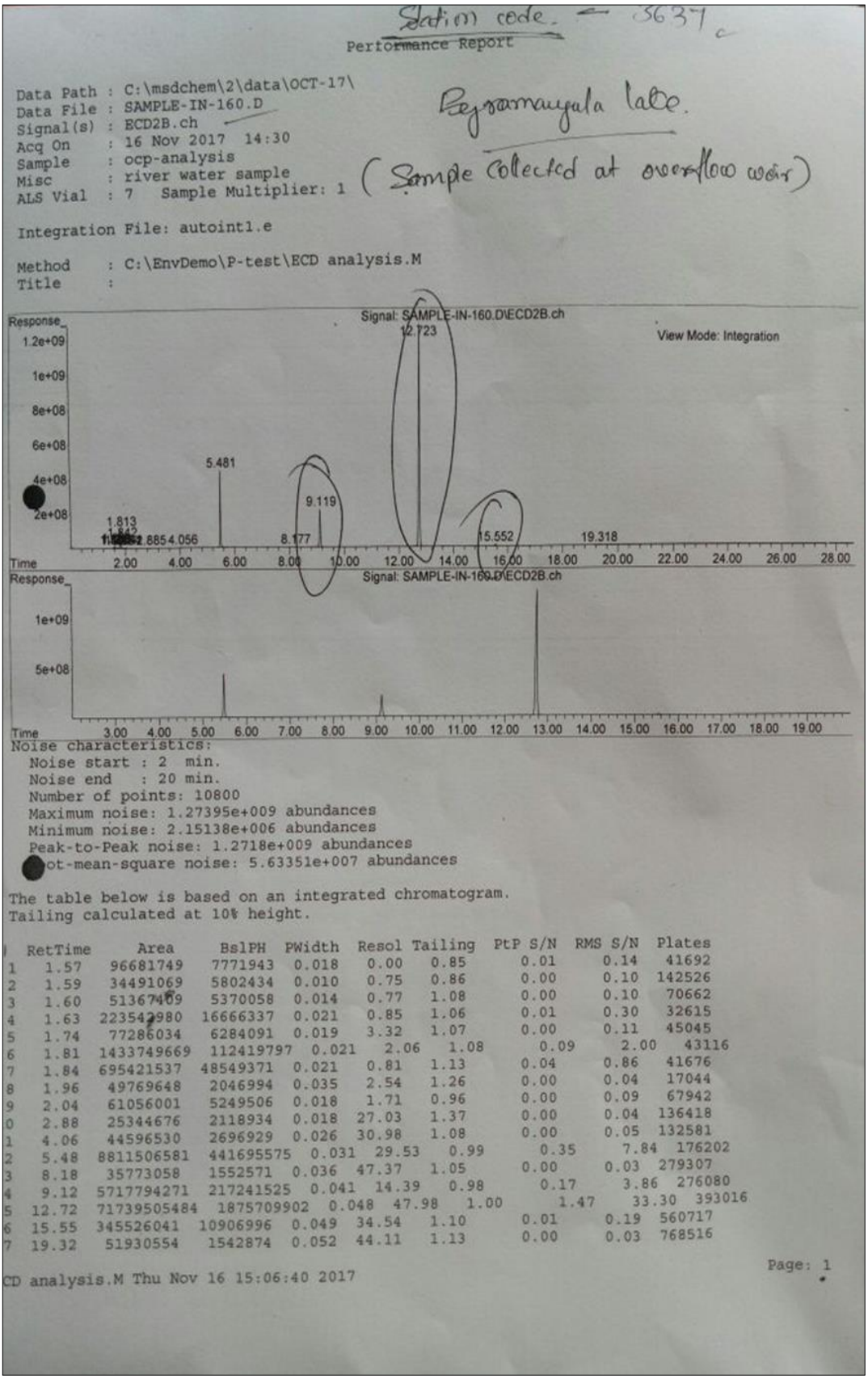
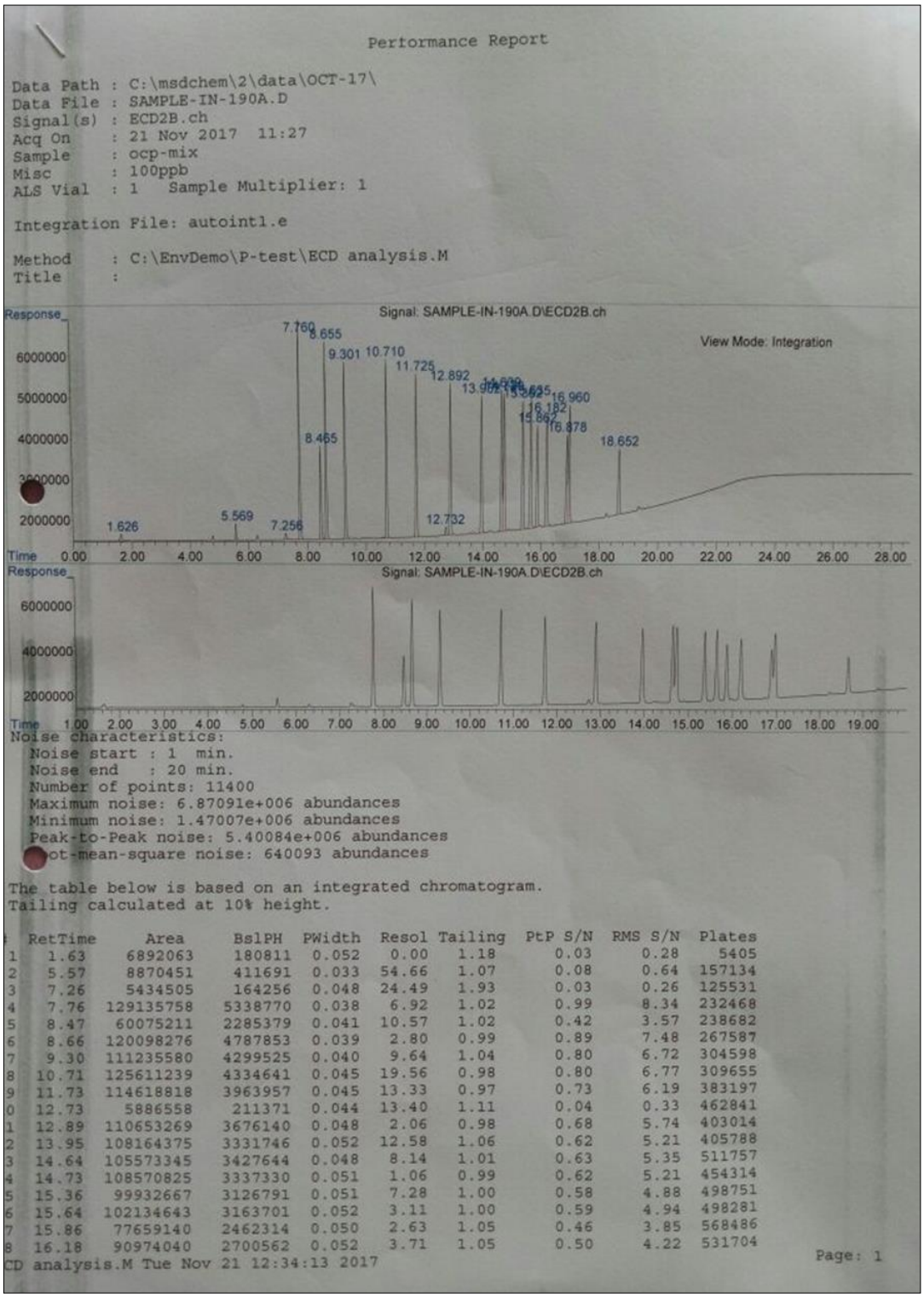


Fig 1: Shows graphical representation of pesticide residues in Byramangala Lake



	RetTime	Area	BslPH	PWidth	Resol	Tailing	PtP S/N	RMS S/N	Plates
1	1.63	6892063	180811	0.052	0.00	1.18	0.03	0.28	5405
2	5.57	8870451	411691	0.033	54.66	1.07	0.08	0.64	157134
3	7.26	5434505	164256	0.048	24.49	1.93	0.03	0.26	125531
4	7.76	129135758	5338770	0.038	6.92	1.02	0.99	8.34	232468
5	8.47	60075211	2285379	0.041	10.57	1.02	0.42	3.57	238682
6	8.66	120098276	4787853	0.039	2.80	0.99	0.89	7.48	267587
7	9.30	111235580	4299525	0.040	9.64	1.04	0.80	6.72	304598
8	10.71	125611239	4334641	0.045	19.56	0.98	0.80	6.77	309655
9	11.73	114618818	3963957	0.045	13.33	0.97	0.73	6.19	383197
0	12.73	5886558	211371	0.044	13.40	1.11	0.04	0.33	462841
1	12.89	110653269	3676140	0.048	2.06	0.98	0.68	5.74	403014
2	13.95	108164375	3331746	0.052	12.58	1.06	0.62	5.21	405788
3	14.64	105573345	3427644	0.048	8.14	1.01	0.63	5.35	511757
4	14.73	108570825	3337330	0.051	1.06	0.99	0.62	5.21	454314
5	15.36	99932667	3126791	0.051	7.28	1.00	0.58	4.88	498751
6	15.64	102134643	3163701	0.052	3.11	1.00	0.59	4.94	498281
7	15.86	77659140	2462314	0.050	2.63	1.05	0.46	3.85	568486
8	16.18	90974040	2700562	0.052	3.71	1.05	0.50	4.22	531704

Fig 2: Shows graphical representation of pesticide residues in Mulbagal Lake

Detection of pesticide residues in the water samples of By Ramangala lake are summarized (Table 1) and Residue levels of organochlorines were represented (Figures 1). It shows that, organochlorine residues in the water samples areα-HCH (1.18PPb) and 4, 4'-DDD (4.01PPb) Endrin Aldehyde (5.08PPb).Although DDT was not detected in any of the samples, one of its metabolites, 4,4'-DDD was detected. 4,4-DDD found in the environment might have resulted from the pesticide application, other than agricultural uses, especially for vectors [17]. Endrin Aldehydes used for locust control, Detection of pesticide residues in the water samples of Mulbagal lake are summarized (Table 2) and Residue levels of organochlorines were represented (Figures 2). Pestiside residues were not detected in any of the water sample of Mulbagal lake.

Conclusion

Based on the experimental results it can be concluded that, detection of pesticide residues in Byramanagala lake water samples, which might be due to the application of pesticide residues to boost up of the crop yields and application for other than non-agricultural uses like industrialization, especially for vectors are also responsible for the accumulation of residues in the lake ecosystem. Modern agricultural practices and effluent released from the industries are degrading the environmental quality of lake in the vicinity of the Byramangala tank need to be paid much attention.

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References

1. Sivshankaran MA, Sivamurthy Reddy S, Govindaradjane S, Ramesh R. Organochlorine residuals in ground water of Pondichaery.
2. Region. Journal of Environ. Science & Engg Manoj Kumar, Ashok Kumar. Application and health effects of pesticides commonly used in India, 2007; 49:7-12. http://www.eco-web.com.
3. Scott Weir, Marianne Dobrovolny, Chelsea Torres, Cassie Torres, Matt Goode, Thomas R, *et al.* Anderson, Organochlorine pesticides in squamate reptiles from Southers Arizona, USA, Bull Environ Contam Toxicol. *2003;* 90, 654-659, Doi 10.1007/s00128-013-0990-y.
4. Sethuraman A, Subramanian AN. Organochlorine residues in the Avifauna of Tamil Nadu (Southeast coast of India), Chemistry and Ecology. 2003; 19:247-261.
5. Kaushik. Oganochlorine pesticides residues in air in Delhi, India, Wat Air Soil Pollut. 1987; 32:63-76,
6. Ramesh. Seasonal variation of organochlorine insecticides residues in air from Portonova, South India, Env Pollut. 1989; 62:213-222.
7. Ngebe B, Biddleman TF. Occurrence and vapour particle partitioning of heavy organic compounds in ambient in Brazzaville, Congo. Environ Pollut. 1999; 76:147-156.
8. Iwata Geographical distribution of persistant organochlorines in air, water and sediments from Asia and Oceania and their implications for global redistribution from lower latitudes, Environ Pollut. 1994; 85: 15-33.
9. Postel S. Controling toxic chemicals, Environmental Science and Technology. 1988; 22:.23-25.
10. Goldberg ED. Halogenated hydrocarbons, past, present and future problems, Science of the total Environment, 1991; 100:17-28.
11. Dikshith TSS, Raizada RB, Kumar SN, Srivatsava MK, Kulshrestha SK, Adholia UN. Residues of DDT and HCH in major sources of drinking water in Bhopal, India, Bull Environ Contam Toxicol. 1990; 45p:389-393.
12. Jani. Residues of organochlorine pesticides and polycyclic aromatic hydrocarbons in drinking water of Ahamadabad city, India Bulletin of Environ Contain and Toxi. 1991; 47:381-385.
13. Ramaswamy Babu Rajendran, Annamalai Subramanian. Pesticide residues in water from River Kauveri, South India, Chemistry and Ecology. 1992; 13:223- 236.
14. APHA, AWWA, WPCF Standard methods for examination of water and waste water (20th Ed.), American Public Health Association, Washington, D C, 1995.