

ORIGINAL ARTICLE

Pesticides in sewage and industrial effluents in Godavari river Nanded region, Maharashtra, India

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ABSTRACT

Sewage water and industrial effluent samples were collected from selected point where they are used for irrigating the agricultural fields. The HCH-isomers were found to present in these waters while another organochlorine compound and DOT were absent. Amongst HCH- isomers, β -HCH was found higher in all samples.

Keywords: Pesticide, Sewage, Industrial effluents.

1. INTRODUCTION

Pesticides are toxic not only to the insects and pests but also to the plants, fishes and other organisms. The crop yields could upset by long-term deterioration of soil fertility due to disturbance of nutrient cycling through the effect of pesticides.

The sewage and industrial effluents are being used for irrigating the fields by farmers as the water is still a scarce commodity in the surrounding areas of industrial zone of Godavari River (Maharashtra). The Rivers are polluted due to domestic waste, sewage, industrial and agriculture effluents [1,2,3,4]. These workers also mentioned to pay the necessary attention to overcome the alarming situation, which is likely to occur near future by use of urban and industrial effluents. No studies were undertaken to quantify the presence of pesticides in the sewage and effluents of industries. Therefore, a study was undertaken to quantify the presence of different pesticides in these effluents.

2. EXPERIMENTATION

Four industrial effluent samples were collected from effluent channel nearby Nanded which is surrounded by dyes, chemicals, fertilizers, pharmaceuticals, gelatin, polymers, resins, plastic, industrial gases and agro industries. Sewage water of Nanded city was collected for the study.

Extraction:

An aliquot of 500 ml of effluent and sewage water sample was mixed with 50 g NaCl in a separating funnel. The pesticide residues were extracted with 150 ml of 15% dichloromethane in n-hexane. The lower layer of organic phase containing pesticide residues was passed through a bed of anhydrous sodium sulphate. The extraction was repeated twice with 100 ml of 15% dichloromethane in n-hexane. The combined organic phase passed through the bed of anhydrous sodium sulphate was evaporated to 2 ml using vacuum rotary evaporator. The residues

were re-dissolved in a 5 ml of n-hexane and the process was repeated twice. The final volume was made upto 5 ml using iso-octane for the quantitative estimation on gas liquid chromatography.

Quantitative estimation:

The residues of organochlorine insecticides (HCH/DDT/endosulfan/chlorophyrphos) were quantified on chemito GL-8510, equipped With Ni⁶³-ECD (Electron Capture Detector) with the following operating parameters and conditions.

Table 1. R_t values of different pesticides

Compound	Retention time
α-HCH	1.56
β-HCH	1.79
γ-HCH	2.02

Table 2. Concentration (ppb) of different pesticides in sewage water and industrial effluents

Compound	Sewage water	Industrial effluents Center	
		Koyali mix.	Refinery
α-HCH	0.098-0.735	ND	0.039
γ-HCH	0.482-0.503	0.031	0.073
β-HCH	Tr.- 0.024	0.475	0.257

ND-Not detected

Column: 5% ov - 17 packed on chromo sorb W (HP), 2 m length.

Temperature: Column : 220 °C

Injector : 220°C

Detector : 350°C

Carrier gas : Nitrogen 30 ml min⁻¹

RESULTS AND DISCUSSION:

The compounds were identified by comparing the chromatograms with those of standard compounds.

Under these conditions the retention times (in min.) were obtained (Table 1).

The concentration of insecticides found in sewage and industrial effluents are given in Table 2.

The analysis showed the presence of HCH while DDT and other organochlorine compounds viz. endosulfan, chlorophyrphos were absent. The maximum allowable limit set is 1 ppb for the individual HCH isomers.

HCH isomers in all effluent samples as well as in sewage water are in lower content than permissible limit. High level of β-HCH in these samples is matter of concern because these HCH-isomers are lipo-philic in nature and get deposited in adipose tissues of human being and animals.

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