Soil pollution assignment

Source identification revealed that soil residue levels have originated from long past and recent mixed source of technical HCI and Linden for Has and mainly chemical EDT for Adds. Spatial distribution was also investigated to identify the areas with higher pesticide loadings in soil. & 2011 Elsevier Inc. All rights reserved. Keywords: Organogenesis pesticides EDT HCI Agricultural soils India 1. Introduction All over the world, approximately three million people get poisoned and about 200, 000 die each year from pesticide poisoning and a majority of those belong to the developing nations (WHO/ UNEVEN Working croup, 1990; FAA/WHO (2000)).

The figures may be even greater due to under reporting or lack of authentic and reliable data. Residues of reconciling pesticides (Cops) are considered as endocrine disrupter and carcinogens (Wolff et al. , 2000; Amoral Mended, 2002; Charlie and Plotted, 2002; Gammon et al. , 2002; Brood and Ruder, 2003). Accumulation of Cops in human body may increase risk of various types of human cancer including breast, lung, cervix, prostate and some other health effects such as endometriosis, hypoxia’s and cryptographically (Hosier et al. , 2000; Wolff et al. , 2000; Aimed et al. , 2002; Amoral Mended, 2002).

Also, associations have been reported about the effects of Cops exposure on human growth (Lengthener et al. , 2001 ; Gladden et al. 2003; Nagoya et al. , 2007; Olivarez-bedroll et al. , 2008; shell et al. , 2008), mental and psychosomatic development (BBC, 2006; Ribs-Fit et al. , 2006; Tortes-Sanchez et al. , 2007; Savings et al. , 2008). Organogenesis pesticides have been of great concern due to their presence in high concentrations even in

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Sahara), sudsier.Com (S. Kumar). Despite ban on their production and usage (Surge and Tanana, 2001; Karakas et 2008). Dichlorodiphenyltrichloroethane (EDT) and chlorofluorocarbon (HCI) are two Cops, which have been widely used as insecticide in vector control programs and as pesticides in agriculture. These compounds are ubiquitous anthropogenic environmental contaminants and have been linked with various health- related and environmental risks and damage. In tropical Asian countries, application of Cops such as Adds and Has has been considered with concern (Essentialist et al. 2001) as they constitute major part of pesticide consumption. Since Cops are non-bio-degradable or degraded very slowly, their concentrations accumulate in the environment (Ala and Saxons, 1982; Nab et al. , 2003). Accumulation of these compounds in the food chain via agricultural fields has led to them being extremely widespread in nature with the associated environmental risks (Simonton and Hides, 1995; Premier et al I, 2010). These pollutants contaminate surrounding soils and water resources and in some cases may endanger drinking water supplies.

Agricultural soils may act as a source of “ aged” and recent Cops as a fraction of them may get volatilities and dispersed, making them reservoirs of these pollutants and a risk for soils and sediments (Tan et al. , 2007; Hay et al. , 008; Premier et al. , 2010). In soil, pesticide compounds (EDT and HCI) undergo a series Of processes, which depend on physics-chemical, biological and pedagogic environment (Arias-Settees et al. , 2008). Their degradation

intensity depends on various factors such as temperature, pH, soil type, soil moisture and organic carbon content as well as 0147-6513/$ – see front matter & 2011 Elsevier Inc.

All rights reserved. DOI: 1 0. 1 016/j. Eocene. 201 1. 09. 014 Please cite this article as: Mishear, K. , et al. , Contamination levels and spatial distribution of organogenesis pesticides in soils from India. Cotillion. Environ. Safe. (201 1), 10. 101 6/J. Eocene. 2011. 09. 014 2 K. Mishear et al. / Ichthyology and Environmental Safety the chemical-specific parameters (Mans et al. , 2001 ; Premier et al. , 2010). Also the differences in Has and Adds composition and the ratios between a-HCI and g-HCI and up-EDT and up-DEED are therefore often used as indicators of relative importance of contamination sources, I. E.

Technical HCI/Linden or Recent/ Previous EDT exposure (Tan et al. , 2007). Among the countries that continue to use Cops, India is ranked one Of the major producers and consumers in recent years. In India, Cops especially EDT and HCI were used extensively from past several decades till recently for both agricultural and health purposes due to their low cost and versatility in action but there is always a tendency to use them in excess amount. Between the periods of 1958-2004, production of pesticides (especially insecticides like EDT and HCI) in India had increased from 5000 to 85, 000 metric tons (Guppy, 2004).

DOT, one of the most notorious pesticides of all time, is being used even today on a larger amount to overcome malaria situation, despite of its ban in most of the countries. Since malaria is still a serious health problem in different parts of our country, the present perception of EDT use is

reasonable in India. Indoor residual spray with EDT is a comparatively cheap, quick, short term and main method for vector control (Organ and Chin, 2005). Environmental fate of Cops residues is now getting much more attention due to contamination of food, groundwater and even drinking water supplies.

Although Occurs have been applied for more than 30 years in this region, no studies have been carried out to check the contamination status of soil system of the area and the human exposure to these chemicals. Alarming levels of Cops have been reported in the environment (air, soil and water) as well as in biological and food materials from various parts of India (Afghanistan, 1985). The current perspective emphasizes upon incessant monitoring and observation of Cops status in soil profile of this region where these are being applied in large quantities.

The present study was conducted as a preliminary survey of soil contamination to evaluate the potential risks to human health and safety of environment in the region. The approach of the present study is to provide useful information on the extent of Has and Adds intimidation in soils of selected districts of Assam state and their spatial distribution to identify the possible sources and pathways of pollution and to explore the factors affecting contamination to prevent further deterioration of the environment. 2. Material and methods 2. 1.

Study area The investigation area was located in districts Anglo and Debugger of Assam state (latitude 241440 to 271450 N and longitude 891410 to 961020 E), North-East India (Fig. 1). The state is strategically

placed, bounded by the hill states of Raunchy Pradesh, Maniple, Emphysema, Mozart, England and Tripper, and shares an international border with Bhutan on the north and Bangladesh on the south. Assam is the most populous (31. 17 million in year 201 1) and second largest state (78, 523 km) in north-eastern India. Assam alone, with only 2. Percent of the country's population, contributes more than five percent Of the total malaria cases in the country. The region is highly affected by malaria transmission due to excessive (2000-3000 mm) and prolonged rainfall and high humidity (60-90 percent) and warmer climates (22-33 1 C) for most part of the year, which promotes vector breeding and longevity. Anopheles minimums, A. Dirks and A. Flutists are the main vectors responsible for malaria transmission in the state. All these vectors are found to be highly susceptible to EDT. Thus, residual spraying with two rounds of EDT (1 g/mm) is the main method for vector controls.

Despite the global treaty to ban the use of EDT and related organogenesis, due to lack of suitable alternative for malaria eradication in the north-eastern India, these compounds have been used in this region for more than 30 years (Deep et al. , 2001). The study area is rich in forests and water and has vast tracts of fertile land. More than 77 percent of the population is engaged in agriculture and allied activities. Around 40 percent of the total area is cultivated and cereals like rice and wheat and plantation crops like tea are grown extensively.

Due to intensive agriculture in this region, application of technical HCI and linden is very high in both the districts. 2. 2. Collection of soil samples Surface soil samples (0?? 30 CM depth) were collected from different land

uses including agricultural fields of payday and vegetable fields, tea gardens, fallow land and urban land during 2009-2010. Each sample was a composite of 5-6 baseless of surface soil that were mixed thoroughly before packing in sterile polythene bags. Each sample was divided into two portions, one for Cops analysis and the other for soil physics-chemical analysis.

A global positioning system (GAPS, Garaging 1 2 XSL) was employed to precisely record each location of soil sampling. Basic properties of soil samples are given in Table 1 . Soils of the study area are composed of fluvial sediments, classified as new and old alluvium. According to USDA texture classification, soil texture is mainly sandy loam to sandy clay loam for new alluvium and fine to coarse am for old alluvium. The clay (00. 002 mm) and silt (0. 05-0. 002 mm) content in Anglo district varies from 8. 7 to 35. 3 percent (VA. 22. 1 percent) and 19. 2 to 46. 6 percent (VA. 8. 7 percent). In Debugger district, the clay and silt amount varies from 6. 3 to 28. 4 percent (VA. 19. 2 percent) and 12. 5 to 34. 9 percent (VA. 24. 3 percent). Total organic carbon was determined by wet oxidation using method given by Walkway and Black (1965). A conversion factor of 1. 724 has been used to convert organic carbon to organic matter based on the assumption that organic matter contains 58 percent organic C (I. E. Organic matter%organic C 1 . 724) (Nelson and Somers, 1996). The organic carbon content was found to be relatively higher in these soils.

Mean values for soil organic carbon are 4. 8 and 4. 3 percent in districts Anglo and Debugger, respectively. Soil pH was determined from 1: 5 soil?? water slurry by pH meter. Soils were generally slightly to moderately acidic having mean values Of pH 5. 9 and 6. 2 for districts Anglo and Debugger,

respectively. 2. 3. Analytical procedure In the laboratory, soil samples were dried and sieved through 100 meshed steel mesh. Extraction of pesticides from soil was done according to the teeth described by Sings et al. (1999).

Air dried soil sample (50 g) was taken in 100 ml solvent of hexane: ethyl acetate (9: 1 v/v) in a conical flask, plugged with cotton wool and then kept on a rotary shaker at 200-250 RPM for 12 h. The mixture was filtered and the remains were recreated twice with additional 50 ml of the same solvent mixture. Final extracts were pooled and cleanup of samples was done using a glass column packed with five percent deactivated alumina and anhydrous sodium sulfate. The column was eluted with n-hexane: benzene (1 : 1, v/v). After cleanup, the final extracts were incinerated to near dryness using rotary vacuum evaporator.

Quantitative analysis of the CO-Adds and CO-Has were undertaken using an Agilest model 6890 Gas Chromatograph (GO) equipped with Electron Capture Detector (Nine). The column used for the analysis was HP-5 capillary column of 0. 32 mm id, 0. 25 mm film thickness and 35 m length. The oven temperature started from 150 ICC with hold time for 1 mint then increased to 200 ICC at a rate off ICC min?? 1 with hold time for 5 min and finally to 290 ICC at a rate of 10 ICC min 1. The injection port temperature was kept at 285 ICC and the detector temperature was at 300 1 C. Nitrogen was used as carrier gas ATA constant flow of 1 ml min ?? 1.

Nitrogen was also used as a makeup gas at 75 ml min ?? 1. 1 ml volume of samples was injected in split/spiritless mode. The linear range of the detector was determined from injection of standard mixtures. Calibration

lines were performed for all the Cops and the resulting correlation coefficients (re) for the calibration curves were all greater than 0. 99. The concentrations of individual SOC were then quantified by comparing the peak area of the particular compound in sample extracts to that of the corresponding external standard after replicate analysis. . 4.

Quality assurance With each set of 15 samples, a procedural blank and a spiked matrix sample with known amounts of standards were run to check for contamination, peak identification and quantification. The limits of detection (OLD) of Cops were determined as the concentration of analyses in a sample that gives rise to a peak with a signal to noise ratio (SIN) of 3. Method Loads for Adds and Has ranged between 0. 014-0. 042 Eng/g and 0. 019-0. 039 Eng/g. The mean levels for each pesticide residue were calculated with the assumption of zero for undetected values. The level was designated as undetected (ND) if it was low OLD.

Method precision and accuracy was tested by spiking experiments with all studied compounds at 3 different spiking levels. Pesticide recoveries were determined relative to the ratio of direct injection of extract and the working standards prepared in hexane. The mean recovery of Occurs was estimated at mean concentration levels. Recovery percentages ranged bejmen 83. 4 and 97. 2. Triplicate samples were analyzed during each run to evaluate the reproducibility of the overall method. The relative standard deviations (RSI) for triplicate samples were less than ten percent.