



Determination of Organochlorine and Organophosphorous Pesticide Residues in Irrigated Water from Gubi, Waya Dams and Gudum Fulani Irrigation Sites in Bauchi LGA, Bauchi State, Nigeria Using Composite Sampling.

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ABSTRACT

Due to the vital role of water for humanity, it is necessary to improve and maintain its quality. Environmental and global changes especially industrial wastes, domestic and agricultural activities are the main sources of water pollution. This research seeks to investigate organochlorine and organophosphorous pesticides residues from irrigated water samples collected from Gubi, Waya Dams and Gudum Fulani irrigation sites in Bauchi, Bauchi State. Water samples were collected and extracted by liquid-liquid extraction using dichloromethane (DCM) solvent. Water extracts were quantitatively analyzed using GC-MS analysis. GC-MS analysis revealed that: Heptachlor (9.887 ± 0.01 mg/L) was detected from WS1. p,p'-DDT (0.293 ± 0.26 mg/L) was detected in WS3. Dichlorvos (2.682 ± 0.041 mg/L, 1.894 ± 0.009 mg/L) were obtained from WS1 and WS3 respectively. The results obtained exceeded their Maximum Residue Limit (MR) when compared with USEPA and Codex Alimentarius FAO/WHO. The order of contamination of water samples is $WS2 < WS1 < WS3$ with WS3 most contaminated. The results showed that these pesticides may show some health concern and the relevant regulatory Agencies of Government should urgently regulate and reinforce the proper use of hazardous pesticides.

1. Introduction

Water plays an essential role for life on earth. It is one of our most important natural resources. Due to fast growing of our civilization, the demand for water has increased dramatically and its uses have become more expensive. Large volume of water is used in industry, agriculture and for personal consumption, with varied impurity. The common harmful impurities of water include bacteria, viruses and different chemical substances such as pesticides. Nowadays, the contamination of water by pesticides is very important ecological problem especially where there is an intensive agricultural practice that involves releasing of highly toxic substances into the water supply which may cause serious effect on human and animal health [1]. Due to the vital role of water for humanity, it is necessary to improve and maintain its quality. Environmental and global changes especially industrial, domestic wastes and agricultural activities are the main sources of water pollution [2].

1.1 Pesticides

Pesticides are any substance or mixture of substances used for preventing, destroying, or killing of pest. A pest is an organism that attack and destroy our farm produce. When a pesticide is applied to a farm land, certain reactions follow. It is first stick to leaves where it is absorbed, then rain fall inevitably washes

some of the chemicals off leaf surface onto the soil below and some may be transformed by sunlight [3].

Every fresh water body such as rivers, lakes and wells may likely contain pesticide residues as pollutants which leached out from soil surfaces or through aquifers. The residues enter natural water from direct application for control of aquatic weeds, trash fish, aquatic insects, percolation and run off from agricultural production fields, drift from agro-allied industrial waste water and discharge from waste waters from clean-up equipment for pesticides formulation application. The residues of these pesticides that are present in water should not exceed extreme limits as this may cause a threat to human health [4]. Organochlorine pesticides have long residual action and persist in the environment for long period without losing toxicity [5]. Even though they have been banned since 1984 to 1988, but their residues are still found in the environment [6]. They have lives ranging from months to years and in some cases decades [7]. Organophosphorous are less persistent in the environment and have high acute toxicity compared to organochlorines. High levels of pesticide residues are responsible for the poisoning and several health's hazard in both rural and urban areas in Nigeria [8].

1.2 Classification of Pesticides

Pesticides are broadly classified into insecticides, fungicides and herbicides. Insecticides are further classified into Organochlorines, Organophosphorus,