

**ASSESSMENT OF ORGANOCHLORINE PESTICIDE RESIDUE
LEVEL IN SEDIMENT, SOIL AND WATER FROM RUSINGA
ISLAND, LAKE VICTORIA, KENYA**

BY:

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DECLARATION

This thesis is the original work of the author except where due references are made. It has not been submitted partially or wholly for the award of degree to this or any other institution of learning

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(I56/69231/2011)

This thesis has been submitted with our approval as university supervisors

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DEDICATION

This thesis is dedicated to my dear wife Edina, my parents Mr. and Mrs. Osoro, my brothers Ladisilus, Fred and Walter, my sister Gesare and friends for their moral and financial support.

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ABSTRACT

While most of organochlorine pesticides have been banned through the Stockholm Convention on Persistent Organic Pollutant, appreciable amounts are still detected in the environment due to their persistence, illegal use and leakage from obsolete stocks. This study was carried out to investigate organochlorine pesticide residue level in representative sites in Rusinga Island of Lake Victoria, Kenya. Sediment, soil and water samples from five sites along the shores of Lake Victoria were collected; soil and sediment were Soxhlet extracted while extraction of water was done using liquid-liquid method using organic solvents. Clean up was done using 8% deactivated alumina and elution achieved by hexane solvent. Detection and quantification of pesticide was done by gas chromatograph equipped with electron capture detector. The survey in Rusinga Island was achieved by using structured field questionnaires which were distributed to 142 respondents chosen randomly.

The pesticides targeted were DDT, γ -HCH, α -HCH, β -HCH, δ -HCH, aldrin, dieldrin, heptachlor, heptachlor epoxide, DDE, DDD, endrin, endrin aldehyde, endosulfan sulfate, methoxychlor and endosulfan. Prior to their ban or restriction in use, these pesticides had found wide applications in public health and agriculture for control of disease vectors and crop pests.

Samples were collected seasonally between months of September 2012 to May 2013 from five sites. From the analysis, Sienge Beach gave highest concentration levels of β -HCH (9.835 ± 2.2 $\mu\text{g/L}$) and lowest detection levels of endrin in month of March in water samples. In sediment samples concentrations of pesticide residue levels ranged from BDL to 32.913 ± 3.84 $\mu\text{g/kg}$. α -HCH gave highest concentration level of 32.913 ± 3.84 $\mu\text{g/kg}$ in month of September and lowest level of no detection for *p, p'*-DDD at Mbita Ice Plant. In soil samples concentrations of

organochlorine pesticide residue levels ranged from BDL to $14.822 \pm 2.84 \mu\text{g/kg}$. β -HCH gave highest concentration level of $8.507 \pm 1.09 \mu\text{g/Kg}$ during the month of May. Month of May recorded highest occurrence of pesticide residue levels as compared to other sampling periods. Sampling sites, Lure had the highest sum of organochlorine pesticide level, while Ligongo had the least sum of OCPs value.

From inventory of pesticides used in Rusinga Island it was found that most commonly used pesticides in the area are organophosphates, organosulfur, carbamates and pyrethroids. Farmers identified the following factors which determined the choice of a given pesticide: increased yield, cost effectiveness, suggested by NGOS, suggested by agrochemical dealers, sales agents and suggested by other farmers.

Farmers within this region mostly obtained information on proper handling of chemicals from: government agricultural extension workers, non-governmental organizations (NGOS), radio, Agro- chemical industries and dealers. General knowledge among farmers about chemicals risks, safety, and chronic illnesses was low. Activities that increase environmental awareness and safety of pesticides should be initiated by the agrochemical firms, NGOs and both the local and national government. This study provides baseline data on the levels of OCP residues in Rusinga Island, Lake Victoria.