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SPATIAL DISTRIBUTION AND ENVIRONMENTAL COMPARTMENTALIZATION
OF DDT AND ITS METABOLITES IN DIFFERENT ENVIRONMENTAL MEDIA
(SOIL, WATER AND PLANTS) IN TSHILAMUSI AREA, MUTALE DISTRICT IN

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DDT [1,1,1-trichloro-2,2-bis-(chlorophenyl)ethane] is a pesticide which has been banned in most developed countries but in South Africa it is still being used especially in the Limpopo Province for Indoor Residual Spray (IRS) to control malaria. The use of DDT has raised concern due to its persistence and long range transportable nature as well as toxic biological effects on the environment. The aims of the study were to determine the spatial distribution and concentration levels of DDT and its metabolites in the soil, water and plants found in and around the DDT sprayed homesteads. Tshilamusi area was selected for the study and the area was divided into three zones with zone A being the zone of application and no spraying in zones B and C. Sampling was done a month after the IRS was completed. Thirty soil samples, eleven plant (leafy vegetables) samples and five tap water samples were collected and analysed for 4,4'-DDT, 4,4'-DDE and 4,4'-DDD residues. The three metabolites were present in all the soil and plant samples, with metabolite 4,4'-DDT being the most dominant. In zone A the mean soil concentration of total DDT (Σ DDT) was 65.69 μ g/kg which was the highest of all the zones followed by zone B and C which had 43.23 μ g/kg and 12.19 μ g/kg respectively. In plant samples 4,4'-DDT was detected in about 80% of the samples analysed and then 4,4'-DDE was the lowest at 40%. The highest concentrations (33.72 μ g/kg) levels in plants was detected in samples collected from zone A and the least concentration (3.84 μ g/kg) was detected in zone C. In soil samples, total DDT comprised of 50 % 4,4'-DDT whereas in plant samples it only accounted for approximately 35% of total DDT and moreover there were higher levels of Σ DDT in soils about three times more than the concentrations found in plants. DDT and its metabolites were found in soil zones B and C, which were never sprayed before and the same results were correlated by the results from plants. The most significant findings from this research is that DDT and its metabolites were detected in environmental media in areas far from the sprayed sites. The results show a strong correlation between distance and concentration levels of DDT and its metabolites.

ABSTRACT

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Keywords: DDT, metabolite, Tshilamusi, spatial distribution, IRS, soil, water, plants