

PERSISTENT ORGANOCHLORINE RESIDUES IN SEDIMENTS FROM THE NORTHERN COAST OF CYPRUS, EASTERN MEDITERRANEAN

Filiz Kucuksezgin ^{1*}, Lutfi Tolga Gonul ¹ and Idil Pazi ¹

¹ Dokuz Eylul University Institute of Marine Sciences & Technology - filiz.ksezgin@deu.edu.tr

Abstract

The OCPs and PCBs ranged between 2.78 to 306 and 15 to 325 ngg⁻¹, respectively. The highest level was found at Yedi Dalga site. DDE was the most abundant compound. POPs in sediments were found to be lower than those in samples for Mediterranean and Black Sea coasts. The SQG showed that, PCBs generally exceeded the ERL and TEL values at most of the studied sites. DDTs were dominant and more ecotoxicological concern in the northern Cyprus.

Keywords: Pesticides, Pcb, Sediments, North-Eastern Mediterranean

Introduction

OCPs and PCBs were produced and widely used for several purposes in the world since 1950s. The use of OCPs have been restricted in most of the developed countries since 1970. However, many developing countries are still using OCPs for agricultural purposes [1]. The Mediterranean Sea is one of the semi-closed sea in the world and has been extensively influenced from the land-based impacts. Cilician Basin, located in the NE part of the Levantine Basin of the Eastern Mediterranean covers the area between Turkey and the Cyprus. Several rivers are reaching to the Cilician Basin along the southern coast of Turkey. In Turkey, production and usage of OCPs were completely officially banned in the 1990s. Cyprus is situated in the extreme northeast corner of the Mediterranean. The southern part of Cilician basin is threatened by industrial pollutants, pesticides used in agricultural areas, and the lack of adequate sewage treatment from the northern Cyprus. No information available from literatures to assess the POPs in the Cilician Basin. The aim of this study is to determine persistent organochlorine residues in the sediments, to explain the sources of POPs and to evaluate the ecological risk in the northern coast of Cyprus.

Results and Discussion

DDE was the most found pesticide, with concentrations ranging from 0.64 to 108 ngg⁻¹ dw while the contents of HCB were the lowest. Maximum concentrations of OCPs were found in Yedi Dalga Region. Minimum levels of Σ DDTs and Σ Cyclodienes were observed in Zeyko region. PCBs showed maximum levels in Yedi Dalga and Zeyko regions. The high PCB levels at these location, suggests anthropogenic sources from western shelf of Cyprus. The ratios of DDE+DDD/ Σ DDT were above 0.5 and DDD/DDE were lower than 1 indicated past usage of DDT. The usage of DDT was completely banned in Turkey before 1990s. The southern part of Cilician basin was threatened by pesticides used in agricultural areas from the northern Cyprus.

According to the established sediment quality guidelines [2], DDTs are the compounds of highest ecotoxicological concern in the northern Cyprus coasts, while other OCPs in surface sediments would be less possible to cause adverse biological effect. The total PCB concentrations in sediment samples exceeded the ERL and TEL values, indicating that adverse biological effects are expected occasionally at the most of the stations. However, PCB levels were above the ERM and PEL values at Yedi Dalga region demonstrated that adverse biological effects on benthic organisms are expected frequently.

Conclusions

In summary, DDT contamination was not highlighted as a contemporary and ubiquitous problem in the sampling area. The highest PCB values were measured in samples from Yedi Dalga and Zeyko sites due to industrial activities. Based on the sediment quality guidelines, the PCBs of the samples generally exceeded the ERL and TEL values, indicating that adverse biological effects are expected occasionally at most of the stations. PCBs were also above the ERM and PEL values at stations from Yedi Dalga site. It may be summarized that DDTs will impose ecologically hazardous impacts in the sedimentary environment at the present.

References

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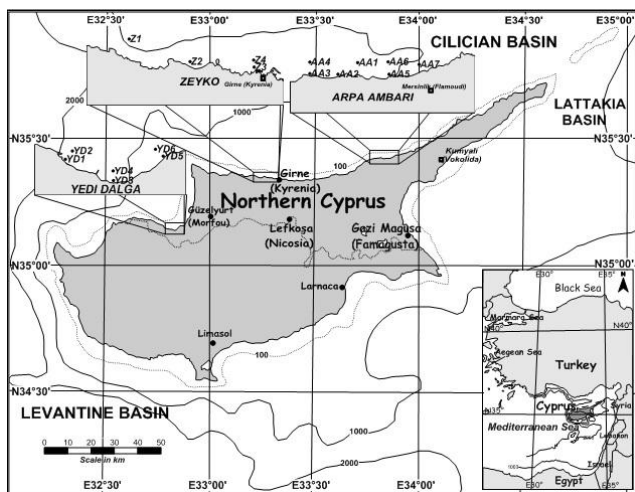


Fig. 1. Location of surface sediment sampling stations from Yedi Dalga, Zeyko and Arpa Ambari regions. Sample locations (black dots) from each area and labelled water depths, while the map to the right corner show Cyprus and main basins in the eastern Mediterranean

Material and Methods

17 sediment samples were collected using a Van Veen grab and the <250 μ m fraction was chosen for grain size correction (Fig. 1). Extractions were performed in microwave extraction system with n-hexane/dichloromethane followed by sulphur removal procedure. The extracts were cleaned up and fractionated using florisil column. Quantitative analysis was performed with Agilent 5975C GC-MS. The reference sediment (IAEA-417) was used as a control for the analysis method.