ANALYSIS OF DDT IN A TYPICAL DDT WASTE CONTAMINATED SITE

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Abstract

The levels of DDT in a historical DDT contaminated site were studied in this article. The center of the WCS was serious polluted by DDT, while the margin was light. The highest level of ∑DDT was 2682.86 mg/kg. In all the surface soil samples, ∑DDT in 3 sites was above 500mg/kg, 4 sites above 50 mg/kg, 5 sites above 10 mg/kg, and 4 sites below 10 mg/kg. The vertical distribution of DDT shows that the levels of DDT decreased significantly with the increase of depth, which mainly due to the infiltration of rainwater was inhibited by the cement or brick surface.

Introduction

China was a major producer and consumer of dichlorodiphenyltrichloroethane (DDT) in the past, resulting in high residual levels of DDT and its metabolites (DDXs) in environment [1]. Although the extensive application in agriculture has been banned since 1992 and the production of DDT has been restricted, the large amount of DDT waste and waste contaminated sites (WCS) is still releasing DDT to environment.

As the typical DDT contaminated site, the historic DDT plant should be paid more attention on. In this study an important DDT plant, ZHD pesticide plant located, was selected. A serious of samples from the old workshop and nearby soil was collected to investigate the residue and transformation of DDT in this WCS.

Materials and Methods

On the basis of the situation of the workshop, 16 sample sites were determined and total 40 samples were collected using the soil sample collector (Eijkekamp, Netherlands). In each sample site, the surface sample (0-20cm) was collected after removing the surface weed and brick etc. Each surface sample was mixed from 5 samples around the sample site according to the club sampling method. In some sample sites, the 20-150 cm depth soil samples were collected in order to investigate the vertical distribution and transformation of DDT. DDT analysis was according to the standard method "Soil quality--Determination of BHC and DDT--Gas chromatography (GB/T 14550-93)".

Results and Discussion

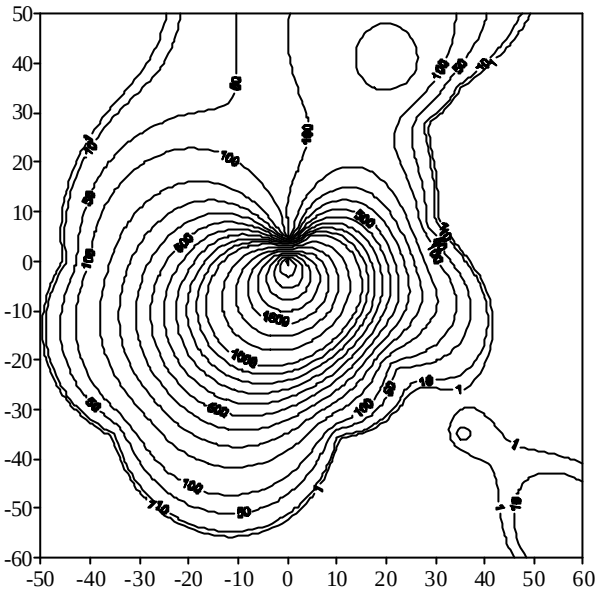
The surface of the workshop and nearby soil was covered by brick or cement. It is helpful to prevent the infiltration of the rainwater and transition of DDT to the deep soil. The levels of DDT in the surface soil samples were presented in Table 1.

Table 1 DDT range in the surface soil samples

	p,p'-DDE (mg/kg)	p,p'-DDD (mg/kg)	o,p'-DDT (mg/kg)	p,p'-DDT (mg/kg)	∑DDT (mg/kg)
Mean	48.31	29.47	72.99	175.58	326.35
Min	0.06	0.02	0.11	0.44	0.62
Max	390.15	191.51	596.70	1504.50	2682.86

In the surface soil, the level order of the 4 DDT isomers was p,p'-DDT 〉o,p'-DDT 〉p,p'-DDE 〉p,p'-DDD. The

isoline map of DDT contamination in the surface soil was given in Fig. 1. The isoline map was protracted using Kriging interpolation method [2].



Note: X,Y-coordinate: sampling distance (unit: m); Isoline unit: mg/kg
Fig. 1 Isoline map of DDT in the surface soil samples

The DDT WCS was near a circle. The center of the WCS was serious polluted by DDT, while the margin was light. The highest level of ∑DDT was 2682.86 mg/kg. In all the surface soil samples, ∑DDT in 3 sites was above 500mg/kg, 4 sites above 50 mg/kg, 5 sites above 10 mg/kg, and 4 sites below 10 mg/kg.
According to the isoline map of the DDT concentration in the WCS, the areas of the different polluted surface soil were presented in table 2.

Table 2 The areas of the polluted surface soil of theWCS

Levels of DDT(mg/kg)	>0	>1	>10	>100	>1000
Areas (m^2)	7369	7305	6814	4453	641

Basically, the levels of DDT decreased significantly with the depth increased. The vertical distribution of DDT in some sampling sites was given in fig. 2. In the central area of the WCS, DDT decreased from 2682.86mg/kg in the surface to 3.44mg/kg in 1.5 m depth. In the 1.2m depth, all the DDT had been lower than 10 mg/kg already.

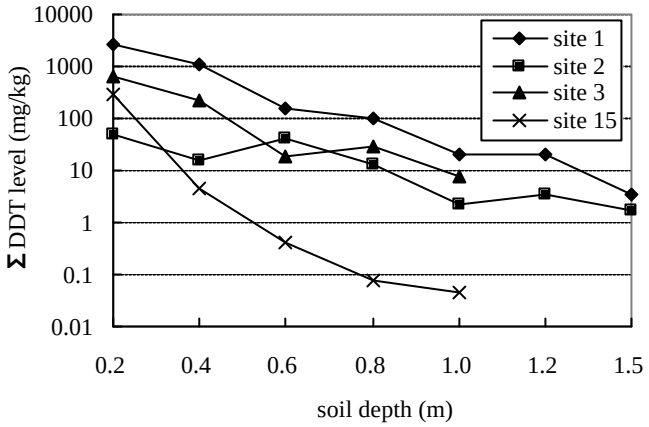


Fig.2 The vertical distribution of DDT in the WCS

The vertical distribution of DDT shows that the levels of DDT decreased significantly with increase of depth, which mainly due to the infiltration of rainwater was inhibited by the cement or brick surface. It was significant to make the surface of the contaminated site indurascent for stopping POPs diffusing and reducing the cost of the disposal and treatment of the contaminated site in the future.

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References

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