REMEDIATION OF DDT CONTAMINATED SOIL BY BIOLOGICAL AND PHYSICOCHEMICAL PROCESS

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ABSTRACT: A practical and efficient disposal method for 1, 1, 1 Trichloro-2, 2bis (4-chlorophenyl) ethane (DDT) -Contained soil is reported. the treatment process was a combination technique first to extract DDT in the soil, and then to hydrogeneate the extracted extract containing DDT. DDT was effectively extracted in the soil and hydro-dechlorinated in this treatment process.

INTRODUCTION:

DDT is an organochlorine insecticide used mainly to control mosquito-borne malaria, use on crops has generally been replaced by less persistent insecticides.it was extensively used during the second world war among allied troops and certain civilian population to control insect typhus and malaria vectors and was then extensively used as an agricultural insecticide after 1945.the reason why DDT was so widely used because it is effective, relatively inexpensive to manufacture and lasts a long time in the environment.

Is DDT still used?

DDT was cancelled adverse because it persists in the environment, accumulates in fatty tissues and can health effects on wildlife.

DDT was banned for use in Sweden in 1970 and in the United State in 1972.

DDT was a commonly-used pesticide for insect control in the United States until it was cancelled in 1972 by the United States environmental protection agency (EPA).

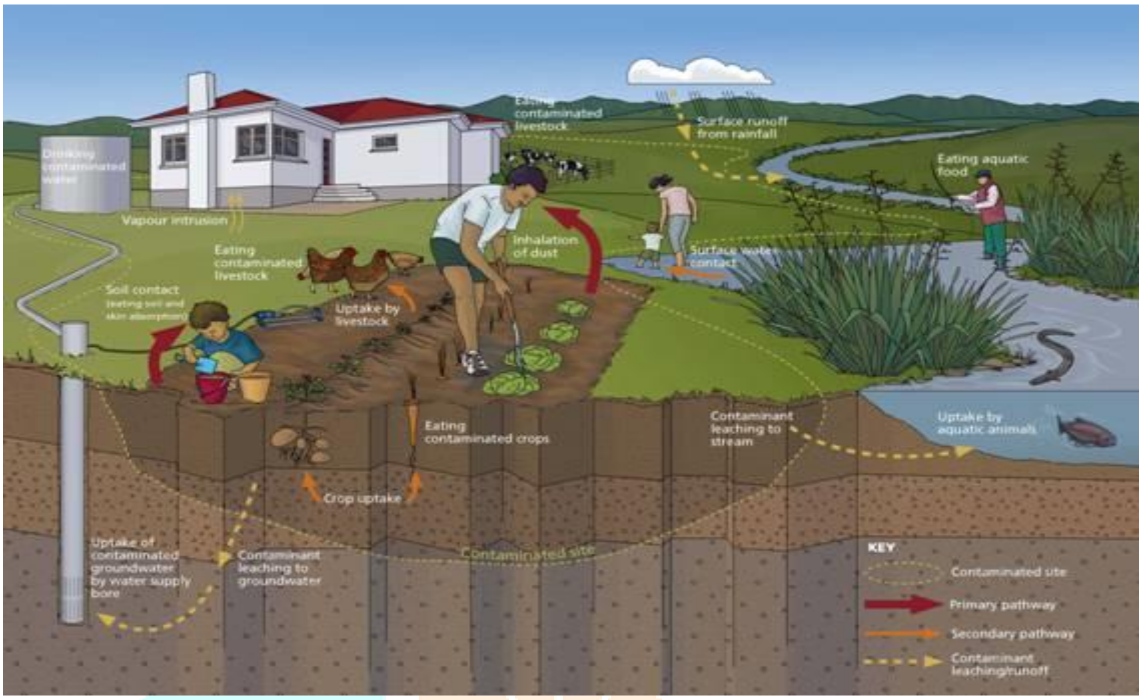
What is bioremediation?

The technology used to speed up the natural process of waste degradation and recycling.

Use of naturally occurring microorganism such as bacteria, fungi and yeast to degrade pollutants hazardous substances is soil, water and air into non-toxic or less toxic substances.

ENVIRONMENTAL FATE:

Breakdown in soil and ground water:



DDT is very highly persistent in the environment, with a reported half-life of between 2-15 years and is immobile in most soils. Routes of loss and degradation include runoff, voltilization, photolysis and biodegradation (aerobic and anaerobic) these process generally occur only very slowly breakdown product in the soil.

Environment are DDE and DDD. Which are also highly persistant and have similar chemical and physical prepration.

Due to its extremely low solubility in water, DDT will be retained to a greater degree by soil and soil perception with higher proportions of soil organic matter.it may accumulate in the top soil layer in the situations where heavy applications are made annually.

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MATERIALS AND METHODS:

DDD, [1, 1-DICHLORO-2, 2 BIS (P-CHLOROPHENYL) ETHANE]

Degration product:

DDD was the first degration product of DDT treated by acid pretreated iron. small amounts of DDE DDMS and DDMU were observed. Quensenet proposed that DDD is the main product from the reductive dechlorination DDT, especially in anaerobic environment.

P^{H} effect on DDT destruction:

Using a PH salt, we controlled the PH of the acid pretreated iron treatment. DDT destruction rate increased as the PH decreased from 9 to 3 .the destruction rates of treating DDT with 5% acid pretreated iron by product.

REMEDIATION OF DDT IN SOIL SLURY:

DDT-contaminated soil slurries were treated by 1.25kg of acid pretreated iron with 3% triton X-100.mass balance revealed that more than 90% of DDT in soil was degraded by acid pretreated within 8 weeks of incubation. Initially 3% triton X-100 released approximately 50%

Of DDT from soil to soil solution while water solubility of DDT in only (.008).increasing the concentration of DDT in soil solution is usually desirable for iron remediation.

SOIL CONTAMINATION:

Soil contamination or soil pollution as part of land degration is caused by the presence of xenobiotic (human made) chemicals or other alteration in natural soil environment.it is typically caused by industrial activity, agricultural chemicals or improper disposal of waste. Contamination is correlated with the degree of industrialization and intensity of chemical usage.

Excavation showing soil contamination at a disused Gaswork-

The concern overall soil contamination stems primarily from health risks from direct contact with the contaminated soil, vapors from the contaminants and from secondary contamination of water supplies within underlying the soil.

SOIL REMEDIATION LEVELS:

Selection of soil remediation levels involves two distinct processes:

1. The developement of exposure scenarios based on either default values or case and receptor-specific assumptions.

2. A risk management decision, separate from the appraisal, regarding what constitutes acceptable risk.

In order to establish soil remediation level risk assessors must provide risk manager with appropriate exposure scenarios relevant to intended land use or estimations of actual receptor lifestyle.

PREPRATION OF DDT CONTAMINATED SOILS:

1. COMMERCIAL (0.0547g) was dissolved in 100ml acetone in volumetric flask the DDT solution was kept with a volumetric flask and stored at 4c for 5ml of 0.547 mg\ml DDT solution was added into 50g soil past through 2mm sieve stirred well and air dried. Than the dried sample was put into 450g soil, sieved at 2mm and mixed well. This was the experimental DDT contaminated soil sample the soil sample was kept at room temperature for four weeks, after that remediation experiments were carried out to assess the remedile potential of laccase. Throughout the experiment the water components and DDTs in the soil samples were 0.351mg/kg (p, p'-DDE), 0.775mg/kg (o, p'-DDT), 1.403mg/kg (p, p'-DDD) respectively.

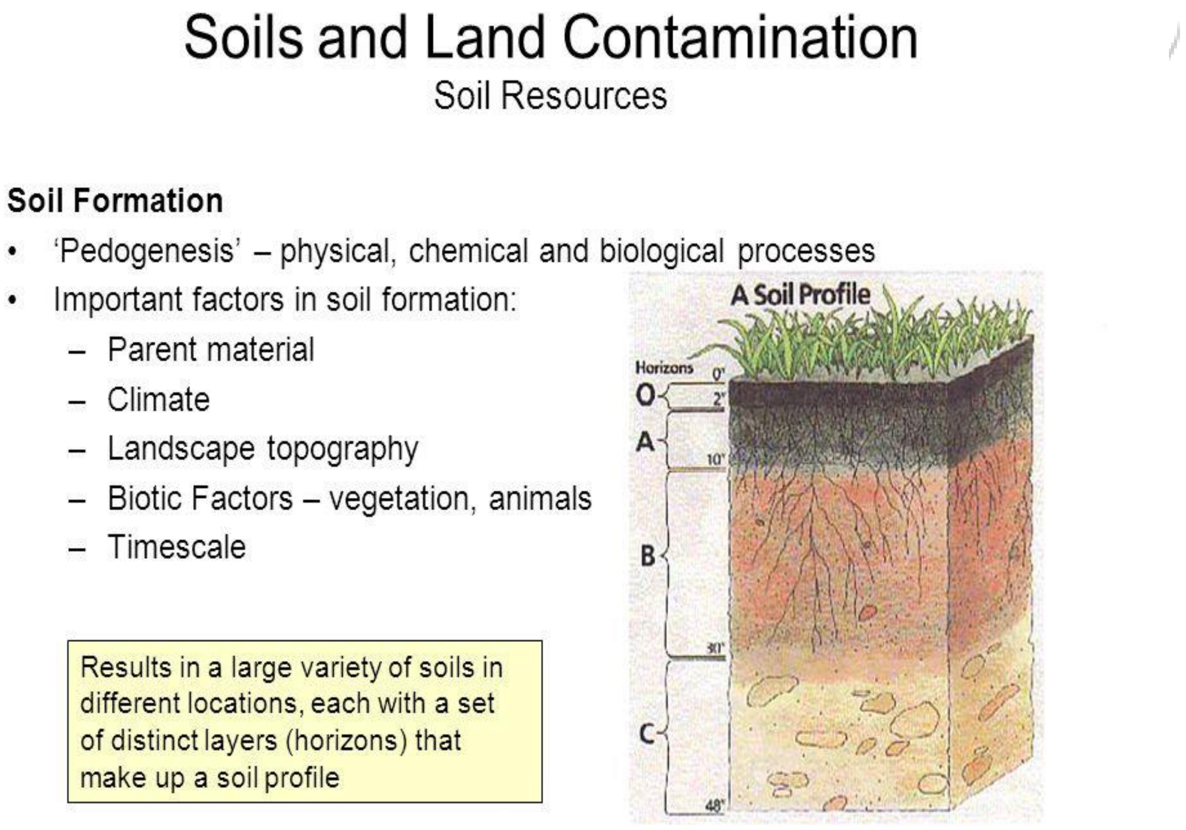

Figure 4 *A stylised soil profile, showing horizons and their relationships* (J Turenne, USDA)

ENZYMATIC REMEDIATION OF DDT CONTAMINATED SOIL:

To study the effect of different atmosphere on remediation of DDT contaminated soil by laccase experiments were conducted under three atmosphere (air, oxygen and nitrogen).To examine the effects of flooding condition on remediation of DDT contaminated soil by laccase of Non-flooding was kept at approximately 15%. The water content in intermitted flooding soil samples were flooded until the end of experiment the flooding soil sample were flooded for 25 days. To create flooding condition of the soils distilled water level in beaker reached 4cm the laccase was split into two portion and added to the soil on day one and day 13 of the soil were 2.5, 3.5, 4.5, 5.5 and 6.5 respectively.

CONCLUSION:

Our results indicate that acid pre-treated the DDT destruction rates by removing the passivating layers. iron by-products from automotive manufacturing can be used to remediate contaminated water and soil with organochlorine pesticides like DDT. Lowering the PH from 9 to 3 in DDT aqueous solution increased.

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