



# **Environmental Pollutions**

**Dr. Jitender Kumar**  
**Assistant Professor**  
**Department of Biotechnology**  
**HMV College**  
**Jalandhar**

# Aims and Objectives

- To study different pollutant ants
- To study their toxicity
- To study their persistence in nature
- To study the harmful effects and diseases caused by them

# Exposure

- Environmental exposure – many will stay in soil or water for decades
  - Slow to breakdown
- Humans consume toxins via fish, meat and dairy
- Food chain
- Agriculture techniques

# DDT (dichloro-diphenyl-trichloroethane)

- Insecticide used to control malaria and typhus by killing mosquitoes and lice.
- Commonly used after WWII
  - Inventor received Noble Prize
- Overused on crops as a pesticide



<http://www.flahumforms.org/FloridaDream/images/Thumbnails/1948-Spraying-DDT-in-war-ag.jpg>



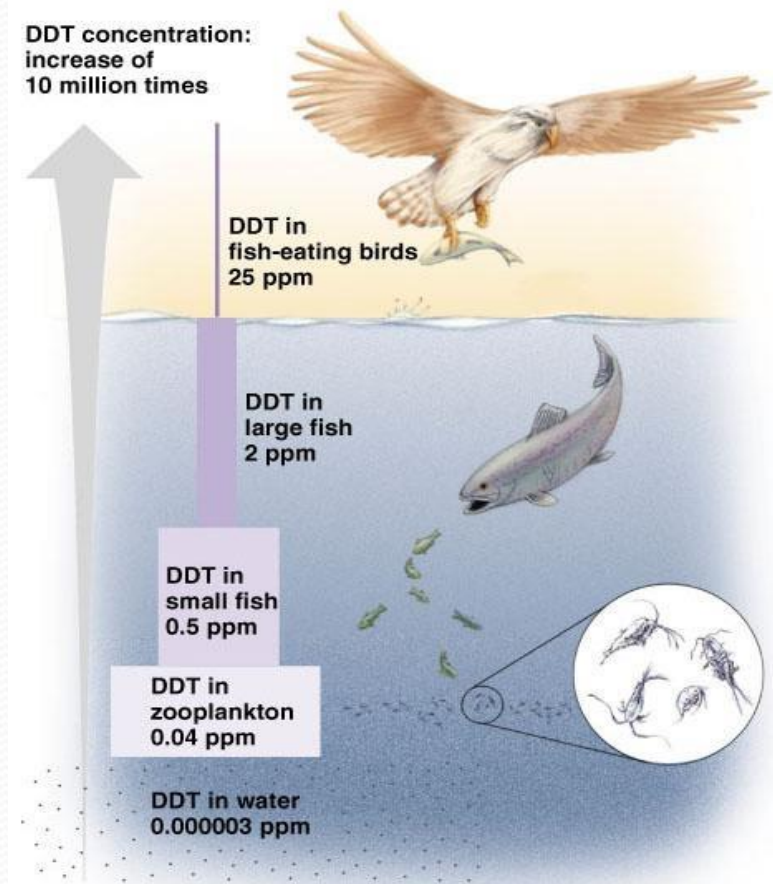
U.S. Department of Agriculture

*In World War II, troops and refugees were dusted with DDT powder to kill the lice that carried typhus.*

[http://commons.wikimedia.org/wiki/Image:DDT\\_WWII\\_soldier.jpg](http://commons.wikimedia.org/wiki/Image:DDT_WWII_soldier.jpg)

# DDT

- Concentration of DDT increased 10 million times!
- Bioaccumulation
- Residual effect



Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

# Pathogenic effects

## Egg shell thinning

- DDT interferes with metabolism of calcium
- Result - thin shells in predator birds such as osprey, bald eagles, brown pelicans
- Birds unable to brood (aka sit on) their eggs without breaking them



# DDT problems (cont'd)

## Feminization

- Acts as a hormone disrupter, mimics estrogen
- Has impacted sex ratio in some birds
- Emergence diseases
- Growth related problems
- Carcinogenicity
- Gastro intestinal problems

# DDT – Future status

- It has a half life of 15 year; it takes 15yrs for its quantity to be  $\frac{1}{2}$  its original



## DDT - it's a long term problem

- It has a half life of 15 year; it takes 15yrs for its quantity to be  $\frac{1}{2}$  its original
- Ex. If we start with 100 kg, we will still have ~ 1 kg after 100 yrs

Year	Amount Remaining
0	100 kg
15	50 kg
30	25 kg
45	12.5 kg
60	6.25 kg
75	3.13 kg
90	1.56 kg
105	0.78 kg

# DDT Present status

- Banned in US in 1972
- Still used overseas to prevent malaria
  - Estimated it save millions of lives annually in Africa

# Reasons for Accumulation

- Over usage of recommended concentration
- Excessive use of fertilizer
- Use of genetically engineered crops
- Domestic sources
- Industrial sources

## Toxic effects

- Some cause cancer, damage nervous system
- Some act like hormones (estrogens) leads to:
  - Developmental changes, birth defects
  - Reproductive and Behavioral problems
- Toxins can be passed to young

# Summary

- Students will be encouraged to take up independent research problem related to biodegradation of recalcitrant POPs present in environment.
- Students will be able to know the various mechanisms involved in environment toxicology and to find the better solution to overcome this problem.
- Students will understand the cause and consequences of biomagnification.

# Future Aspects

- To find out natural microflora involved in their degradation
- To construct genetically engineered strains responsible for their degradation
- Efforts should be done to minimize the usage of pollutants

# Books recommended

- Environmental Biotechnology: Theory and Application by Gareth M. Evans and Judith C. Furlong, 2011, John Wiley & Sons, Ltd.
- Environmental Biotechnology by M.H. Fulekar, 2017, Oxford And Ibh Publishing.
- General Microbiology by Stanier