

POPs
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Persistent Organic Pollutants

Experience exchange tour 2005
Turkey – Bulgaria – Romania

ARNIKA Association & IPEN

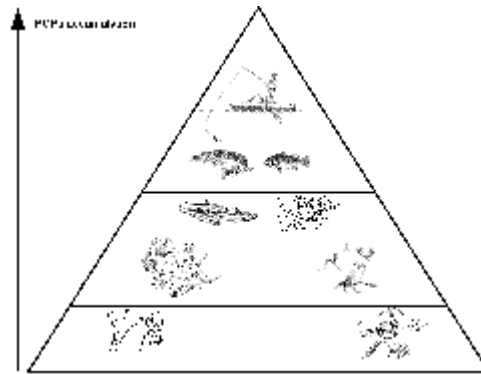


What are POPs?

- POPs = Persistent organic pollutants
- carbon-based chemical compounds and mostly mixtures with halogens (chlorine, bromine etc.)
- primarily products and by-products of human industry / activities
- 12 POPs under Stockholm Convention:
pesticides: DDT, endrin, dieldrin, aldrine, heptachlor, mirex, chlordane, toxaphene
industrial compounds: HCB, PCBs
by-products: dioxins (PCDD), furans (PCDF)

POPs Characterisation

- trans-boundary movement - travelling on long distances
- bio-accumulation in living organisms – fatty tissues
- persistent in the environment



Injury from POPs

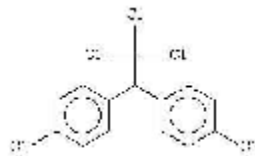
- POPs exposition – food, inhalation, skin contact
- differ according to chemical
- primarily – reproductive system, hormonal system, immune system, nervous system
- contamination of the environment –
indicator - !!! polar regions !!!
soil, water, air, animals, humans

Main POPs Sources

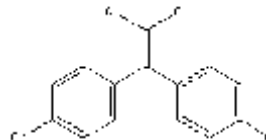
- incineration – municipal, hazardous, medical waste, sewage sludge
- industry – chlor-alkali plants, aluminum secondary plants, organochlorine pesticide plant, coke plant, ...
- landfills – hazardous waste / plastic waste
- fly ash storage, organochlorine pesticide storage, storage of obsolete pesticides, ...

Dirty Dozen

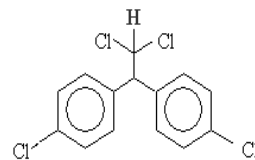
- DDT
- Recognized as an effective insecticide in the 1930s
- Currently is produced in only two countries: China and India
- Still legal use for malaria control
- More than 80 countries have banned or restricted use of DDT
- Metabolites: DDE and DDD (dangerous as DDT)



DDT



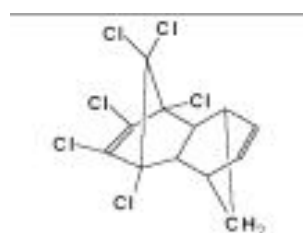
DDE



DDD

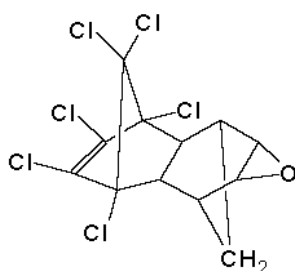
2. Aldrin

- Aldrin quickly breaks down to dieldrin in the environment or in the body
- Since the 1950s, aldrin and dieldrin have been widely used as agricultural insecticides, veterinary agents, termiticides, and vector control agents
- Aldrin has been used as a soil insecticide to control root worms, beetles, and termites.



Aldrin

3. Dieldrin

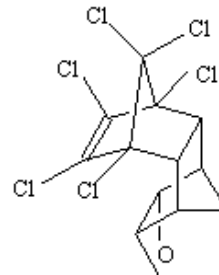


Dieldrin

- Dieldrin persists in the environment and bioaccumulates in body fat
- Dieldrin has been used for soil and seed treatment in agriculture, for control of disease vectors such as mosquitoes and tsetse flies, for veterinary purposes as a sheep dip, and for the treatment of wood and the mothproofing of wool products.
- Many countries restrict or ban the use of aldrin and dieldrin. Some countries continue to permit import for termite control or other purposes.

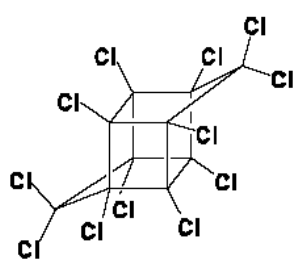
4. Endrin

- Insecticide used mainly on field crops
- Can remain in soil for more than 14 years
- Not easily dissolve in water
- Introduced in 1951, endrin has been used as a pesticide to control birds on buildings and insects and rodents in fields and orchards
- Applied in the production of cotton, maize, sugarcane, grains, apples, and ornamentals



Endrin

5. Mirex

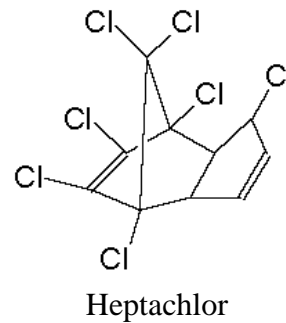


Mirex

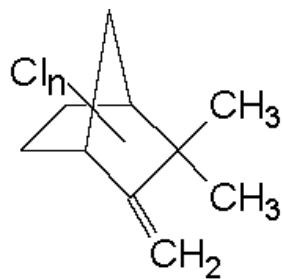
- one of the most stable and persistent pesticides in soil, sediment, and water (a half life in soil of up to 10 years)
- was formerly used as an insecticide (used to combat fire ants, leaf cutters, harvester termites, Western harvester ants, and mealybug of pineapple)
- also had extensive use as a fire retardant in plastics, rubber, paint, paper, and electrical goods

6. Heptachlor

- Cotton insects, grasshoppers, some crop pests, and to combat malaria
- Also used to protect underground cable boxes from fire ants
- Some countries are using heptachlor in wood treatment or for control of termites underground
- Also used to protect underground cable boxes from fire ants



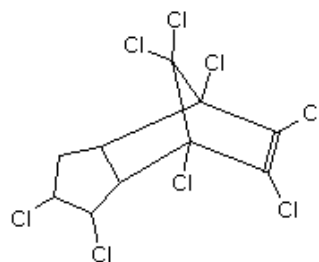
7. Toxaphene



- An insecticide containing more than 670 chemicals
- Does not dissolve well in water, so it is likely to be found in air, soil, or sediment at the bottom of lakes or streams
- Was one of the world's most widely used pesticides in the 1970s
- Was used to control insect pests on cotton, cereal grains, fruits, nuts, and vegetables
- In the early 1990s, toxaphene was produced in Africa and Central America; the heaviest current use is thought to be in Africa

8. Chlordane

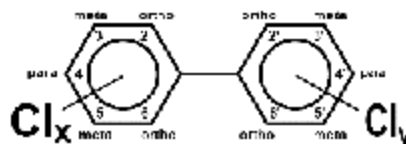
- Broad-spectrum organochlorine insecticide
- Stable in soil and breaks down very slowly when exposed to the ultraviolet action of sunlight; chlordane can remain in the soil for decades, does not readily dissolve in water
- Introduced in 1945
- Was used as insecticide / pesticide for controlling termites and soil-borne insects whose larvae feed on the roots of plants, on corn, citrus, and other crops



Chlordane

9. PCB (Polychlorinated biphenyls)

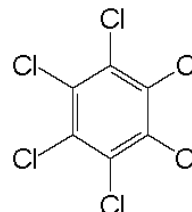
- Family of 209 compounds made up of attached benzene rings with varying numbers and locations of chlorine atoms
- Characterized by their low flammability, low electrical conductivity, high resistance to thermal breakdown and to other chemical agents, and high degree of chemical stability
- First manufactured commercially in 1929, PCBs were produced by many countries including the U.S., China, Slovakia, Germany, Japan, Russia, and the United Kingdom.



- Used in transformers and capacitors, heat transfer and hydraulic systems, carbonless copy paper, industrial oils, paints, adhesives, plastics, flame retardants, and even to control dust on roads

10. HCB (Hexachlorobenzene)

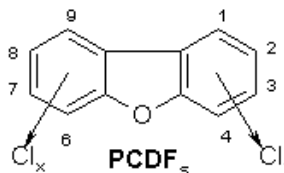
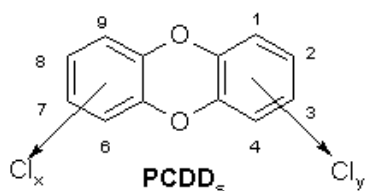
- Synthetic crystalline compound first produced in the 1940s for use as a fungicide
- Used as a fungicide to protect the seeds of onions, wheat, and sorghum
- also been used as a solvent and as a manufacturing intermediate or additive in the production of synthetic rubber, PVC plastic, pyrotechnics, ammunition, wood preservatives and dyes. Production and use have ceased in many countries



- Continues to be created as a by-product in the manufacture of many chlorinated solvents and pesticides and in other chlorination processes. It is found as a contaminant in several pesticides. HCB is also released in the burning of municipal waste

11. / 12. PCDD/Fs (Polychlorinated dibenzo-p-dioxins and dibenzofurans)

- Made up of pairs of benzene rings joined together by one or two oxygen atoms, respectively
- By-products of chemical and combustion processes involving chlorine



11. / 12. PCDD/Fs

(Polychlorinated dibenzo-p-dioxins and dibenzofurans)

- Industrial sources include:
medical, municipal, sewage sludge, and hazardous waste incineration;
cement kilns, especially those burning hazardous waste;
metals smelting and refining;
pulp and paper bleaching;
manufacturing, processing, and disposal of chlorinated plastics and other chemicals
- Industrial sources include:
Backyard trash burning is also a significant source of dioxins in some countries, as is automobile exhaust
Vulcanos

Further Information on POPs

- UNEP - <http://www.chem.unep.ch/pops/default.html>
- Stockholm Convention - <http://www.pops.int>
- Basel Convention - <http://www.basel.int/>
- GEF –
<http://sgp.undp.org/index.cfm?module=ActiveWeb&page=WebPage&s=foPOP>
GEF Small Grants Programme - <http://sgp.undp.org/>
- World Health Organization - <http://www.who.int/en/>
- IPEN - <http://ipen.ecn.cz/>
- IPEP- <http://www.oztoxics.org/ipepweb/>
- WWF - <http://www.wwf.org/>
- Greenpeace - <http://www.greenpeace.org/international/>

Thank you for your attention

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