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The Convention on Persistent Organic Pollutants

The dirty dozen from A to Z

- **Aldrin** is an insecticide used to control soil pests, such as termites and grasshoppers, and larvae (e.g. wireworm). In plants and animals, aldrin is converted to dieldrin, which is also on the list of banned substances (see below). Aldrin is toxic to humans; it is estimated that the lethal dose for an adult would be 5 grams. At lower doses, aldrin is probably carcinogenic. The substance has also been implicated in the death of waterfowl.
- **Chlordane** is a contact insecticide, which has been used in the cultivation of vegetables, maize, fruit and potatoes, and to control fire ants and termites. Chlordane is probably carcinogenic and is toxic to the nervous system. The last manufacturer of chlordane in the US discontinued production in 1997.
- **Dichlorodiphenyltrichloroethane (DDT)** was widely used during the Second World War to combat insect-borne diseases – typhus (transmitted by lice or fleas) and malaria (spread by the *Anopheles* mosquito). DDT is still used to control malaria in several countries today. DDT has a neurotoxic action and is a suspected carcinogen. The substance also has hormonal effects and accumulates markedly in breast milk. Birds that ingest DDT with their food lay eggs with unusually thin shells.
- **Dieldrin** is an insecticide, which has been used to control soil pests and various insect vectors of disease. Dieldrin is formed in plants and animals as a breakdown product of aldrin (also banned; see above). Dieldrin is highly toxic to most fish. The pesticide is tightly bound to soil particles, with a half-life of 5 years in temperate climates. A substantial proportion is likely to evaporate into the atmosphere. Dieldrin is probably carcinogenic.
- **Dioxins and furans** arise as by-products in the manufacture of chemicals such as pesticides and during the combustion of wastes. Furans occur as an impurity in PCBs. Dioxins and furans are toxic even at very low concentrations. Children in particular are exposed to significant levels of these substances in breast milk, which can impair development and affect the immune and endocrine systems. Dioxins also influence the development of cancer cells. In 1976 large amounts of dioxin were released following an explosion at a pesticide factory in **Seveso** (Italy).
- **Endrin** is an insecticide sprayed on the leaves of crops such as cotton and cereal grains. It has also been used to control mice. Endrin is highly neurotoxic. In humans and animals it accumulates to a lesser extent than the very similar substance dieldrin. In soil, however, it has a half-life of up to 12 years. Endrin is highly toxic to fish.
- **Heptachlor** is an insecticide which acts through contact or ingestion. It has been used primarily to control soil insects and termites, but also to combat malarial mosquitoes and crop pests. In humans, heptachlor produces excitation of the central nervous system and causes liver damage. The substance is a suspected carcinogen. It has been implicated in the decline of several wild bird populations. In soil, heptachlor has a half-life of up to 2 years.
- **Hexachlorobenzene** is a fungicide, which was first used to treat seeds in 1945. However, it is also formed as a by-product in the manufacture of chemicals and in combustion processes. Between 1954 and 1959, grain contaminated with hexachlorobenzene was eaten by people in Turkey. As a result, 3000–4000 suffered from a liver disorder in which the synthesis of haem

is impaired; 14% of the patients died. Hexachlorobenzene is a suspected carcinogen. Depending on the soil type, the half-life of this substance may be more than 20 years.

- **Mirex** is an insecticide that acts through ingestion. It has mainly been used to control fire ants, leaf cutter ants and termites. It has also been employed as a flame retardant in plastics, rubber, paints and electrical equipment. Mirex is a suspected carcinogen, which may cause liver damage and also acts on the immune and endocrine systems. The substance is highly toxic to crustaceans. It has a half-life of up to 10 years. When mirex is broken down by sunlight, it forms the even more potent toxin photomirex.
- The term "**polychlorinated biphenyls**" (**PCBs**) refers to a mixture of chlorinated hydrocarbons, which have been used for various industrial purposes since 1930, especially as insulators in transformers and capacitors, as heat exchange fluids, as paint additives and in plastics. In Japan in 1968 and in Taiwan eleven years later, thousands of people who used contaminated rice-bran cooking oil were exposed to high levels of PCBs. The consequences included liver damage and skin disorders. Children born to female victims up to seven years later suffered similar symptoms and mental retardation. PCBs are probably carcinogenic and have been implicated in the poor reproductive success of various wildlife populations, e.g. Arctic seals. Depending on the specific chemical structure, the half-life of PCBs varies from 10 days to as long as 1.5 years.
- **Toxaphene** is a contact insecticide, mainly applied to cotton, cereal grains, fruits, nuts and vegetables. It is a suspected carcinogen. Depending on the soil type, the half-life varies from 100 days to 12 years. As toxaphene cannot be broken down in the liver of marine mammals, it accumulates in fatty tissue, leading to very high concentrations.