

# Endosulfan

Endosulfan is an organochlorine insecticide and acaricide that is being phased out globally due to its acute toxicity. In 2011, the Stockholm Convention initiated a global ban on the manufacture and use of this chemical because of its threats to the environment and human health. It is highly toxic and has a large potential for bioaccumulation. It is also an endocrine disruptor. In India, a 2011 Supreme Court order has banned its production and sale until further notice.

## Endosulfan Uses

Endosulfan is primarily used as an insecticide in agriculture and it is also used as a wood preservative. It is used primarily on food crops like tea, fruits, vegetables and on grains.. It is used against cabbage worms, whiteflies, leafhoppers, aphids and Colorado potato beetles. Due to its unique mode of action, it is useful in resistance management; however, as it is not specific, it can negatively impact populations of beneficial insects. It is, however, considered to be moderately toxic to honey bees, and it is less toxic to bees than organophosphate insecticides.

## How is Endosulfan produced?

Endosulfan is a derivative of hexachlorocyclopentadiene, and is chemically similar to aldrin, chlordane, and heptachlor. Specifically, it is produced by the Diels-Alder reaction of hexachlorocyclopentadiene with cis-butene-1,4-diol and subsequent reaction of the adduct with thionyl chloride. Technical endosulfan is a 7:3 mixture of stereoisomers, designated  $\alpha$  and  $\beta$ .  $\alpha$ - and  $\beta$ -Endosulfan are configurational isomers arising from the pyramidal stereochemistry of the trivalent sulfur.

The World Health Organization estimated that before the substance was banned worldwide, annual production was about 9,000 metric tonnes (t) in the early 1980s. From 1980 to 1989, worldwide consumption averaged 10,500 tonnes per year, and for the 1990s use increased to 12,800 tonnes per year.

## Endosulfan negative health effects

1. **Toxicity:** It is highly neurotoxic to both insects and mammals. Acute endosulfan poisoning causes symptoms like hyperactivity, convulsions, tremors, staggering, lack of coordination, nausea, vomiting, breathing difficulty, diarrhea and also unconsciousness. Some low doses can also cause death in humans, or permanent brain damage.
2. **Endocrine disruption:** Endosulfan is believed to be an endocrine disruptor. Studies have shown that it causes hormone disruption, and reproductive and developmental toxicity.

3. **Reproductive and developmental effects:** Endosulfan adversely affects human development. Many villages in Kasargod District of Kerala have been affected severely because of the exclusive use of endosulfan as a pesticide for a period of almost 20 years. Endosulfan was applied to cashew plantations in these villages. Researchers found that exposed boys from the villages had high levels of endosulfan in their bodies, lower levels of testosterone and have delayed sexual maturity. Studies in California have found that pregnant women exposed to this pesticide are more likely to give birth to autistic children.
4. **Cancer:** Although not conclusive based on any study, it is believed that endosulfan can promote proliferation of human breast cancer cells.

### **Why was Endosulfan banned in India?**

India was one of the biggest producers and consumers of endosulfan. After the toxicity of the pesticide came into limelight because of the precipitating health issues in Kasargod District, Kerala banned it in 2001. Later, the Supreme Court banned the manufacture, storage and sale of endosulfan temporarily in May 2011. And, by the end of the year, endosulfan was banned permanently.

Endosulfan as a pesticide has been in the news for more than a decade now because of the horrid effects it has had on people, especially in villages in northern Kerala. Many children have been born with extreme birth defects and are living miserable lives. It is important to understand the topic from both an environment and a current affairs point-of-view.