

Endosulfan – A Disastrous Pesticide

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Abstract: Endosulfan is used as a pesticide globally. It affects humans, animals and aquatic life and its very difficult to remove it from the food chain. This review article is based on the intensive literature survey on the toxicity of endosulfan to give it a global concern. This review will be a great help for the researchers working on pesticides and will help in creating awareness about their harmful effects on flora and fauna.

Key words: Endosulfan, pesticide, toxicity,

INTRODUCTION

Endosulfan is a globally used as an organo chlorine pesticide. It is used in crops like cereals, coffee, cotton, fruit, oil seeds, potato, tea and vegetables. Toxicity of endosulfan is now subject of concern globally. Endosulfan is a mixture of two isomers alpha-endosulfan and beta endosulfan mixed in the ratio 70:30 respectively.

Among both endosulfan sulphate is more toxic compared to others. This pesticide affects the soil fertility, crop productivity, ecological imbalance and caused human health problems.[1]

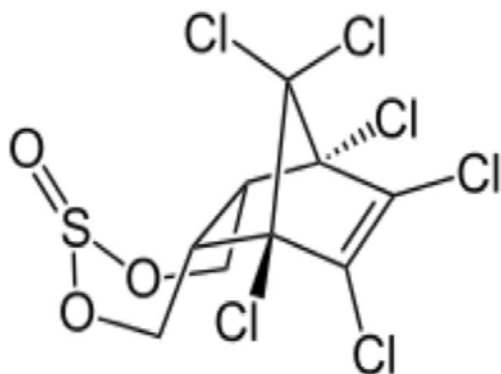
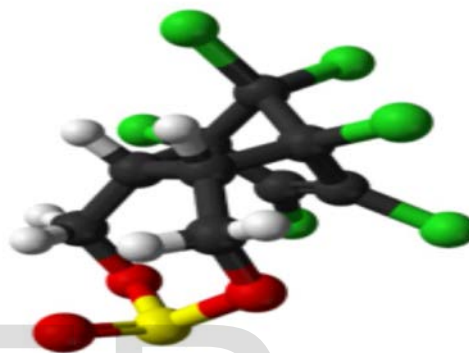


Fig: 1.1 Chemical Structure of Endosulfan[1]

IUPAC name



6,7,8,9,10,10-Hexachloro-1,5,5a,6,9,9ahexahydro-6,9-methano-2,4,3-benzodioxathiepine-3-oxide. It is also known as Benzoepin, Endocel, Parrysulfan, Phaser, thionex[1]



1.FIG: 1.2 3-D STRUCTURE OF ENDOSULFAN

History of commercialization and regulation

In early 1950s: Endosulfan was developed. Hoechst AG (now Bayer CropScience) won USDA approval for the use of endosulfan in the United States [2 later in 2000 it was terminated by EPA. [3] They also made it compulsory that for using endosulfan registration is compulsory later all registration for use endosulfan in Fisheries and Wildlife Service since EPA found that endosulfan residues on food and in water pose unacceptable risks. The agency allowed endosulfan to stay on the US market, but imposed restrictions on its agricultural uses. [3-4]

In 2007 International steps were taken to restrict the use and trade of endosulfan. It is recommended for inclusion in the Rotterdam Convention on Prior Informed Consent and the European Union proposed inclusion in the list of chemicals banned under the Stockholm Convention on Persistent Organic Pollutants. Such inclusion would ban all use and manufacture of endosulfan globally. [4] Meanwhile, the Canadian government announced that endosulfan was under consideration for phase-out [5] and Bayer Crop Science voluntarily pulled its endosulfan products from

the U.S. market[6] but continues to sell the products elsewhere[7].

In February 2008:, environmental, consumer, and farm labor groups including the Natural Resources Defense Council,[8] Organic Consumers Association, and the United Farm Workers[9] called on the U.S. EPA to ban endosulfan. In May, coalitions of scientists, [10] environmental groups, and arctic tribes asked the EPA to cancel endosulfan,[11] and in July a coalition of environmental and workers groups filed a lawsuit against the EPA challenging its 2002 decision to not ban it[12]. In October, the Review Committee of the Stockholm Convention moved endosulfan along in the procedure for listing under the treaty,[13] while India blocked its addition to the Rotterdam Convention.[14]

2009: The Stockholm Convention's Persistent Organic Pollutants Review Committee (POPRC) agreed that endosulfan is a persistent organic pollutant and that "global action is warranted", setting the stage of a global ban.[15] New Zealand banned endosulfan.[16]. In 2010: The POPRC nominated endosulfan to be added to the Stockholm Convention at the Conference of Parties (COP) in April 2011, which would result in a global ban.[17] The EPA announced that the registration of endosulfan in the U.S. will be cancelled[18-19] Australia banned the use of the chemical. In 2011 The Supreme Court of India banned manufacture, sale, and use of toxic pesticide endosulfan in

India. The apex court said the ban would remain effective for eight weeks during which an expert Committee headed by DG, ICMR, will give an interim report to the court about the harmful effect of the widely used pesticide.[20] the Argentinian Service for Sanity and Agroalimentary Quality (SENASA) decided on August 8 that the import of endosulfan into the South American country will be banned from July 1, 2012[21].

STUDY OF EFFECT OF ENDOSULFAN IN INDIA

Between 1976 and 2000, more than 50,000 villagers of Kasargod district in Kerala, India have been exposed to endosulfan, a persistent organic pesticide, sprayed on the cashew plantations owned by the Plantation Corporation of Kerala. More than 3000 people living near, downstream and downwind of the estate were affected by debilitating rare diseases like mental retardation, cerebral palsy, cancer etc. In response to the people's agitation, the National Human Rights Commission (NHRC) mandated the National Institute of Occupational Health (NIOH) to investigate the issue in 2001

Aerial spraying of endosulfan has been banned since 2000. The claim for compensation by the victims has not been settled so far. The state government has been

providing some monetary relief, out of budgetary allocation. A public interest litigation seeking a final decision on the compensation and free medical treatment of the affected people is pending in the High Court of Kerala. According to Mr. Padmanabhan, who has studied endosulfan widely stated that following are the means of endosulfan exposure:

1. to foetus via placenta.
2. To baby from mother's milk.
3. From vegetables and fruits exposed to endosulphan
4. from water
5. from air

SUSCEPTIBLE GROUPS

1. Unborn children, infants and the elderly.
2. People having liver or kidney disease, anaemia.
- 3 People with HIV/ AIDs.
- 4 Malnourished people.

Dr. Y. Mohankumar in Padre Village had published his dreadful finding of 171 patients with severe disabilities and cancer in 126 households. Details are as follows (Table 1)

Mohankumar Database

Households	126
People (estimated)	756
Cancer	51
MR	38
Psy	49
Epilepsy	33
Total cases	171
Percent	22.6

Table :1

The mandate of NIOH (National Institute of Occupational Health) and NHRC (National Human Rights Commission) was to look into the rare and serious anomalies like mental retardation, cancer and other congenital anomalies, as reported by Dr Y Mohan Kumar, who has been practicing medicine in village Padre for about three decades. He had information on 175 diseases/disorders from 125 households.

The Government of Kerala Committee's study was led by Dr Sukumaran [1] and comprised experts in medicine, cancer epidemiology, environmental sciences and agricultural sciences. NIOH study was profound and sophisticated, Sivaraman committees work covered 160,000 people, half them 'exposed' to endosulfan. This is just a gathering of data collected by the Health Department. The committee's outcomes are specified in two tables (lacking table numbers) on pages 21 and 22 of the report. The first table has raw data on disabilities in 8 villages called endosulfan-exposed villages. The

second table has data on same diseases in 7 villages which were not exposed to endosulfan. Generally such data of exposed and unexposed populations are compared using an analytical software but this committee did not follow this.

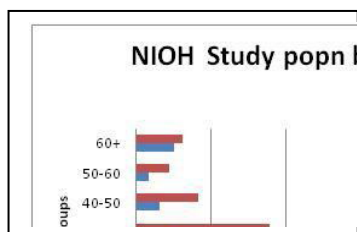


Fig 1: Graph: 1[Ref. 1]

The above graph(Fig 1) shows that in three villages – Enmakaje, Panathady and Kallar there is a severe problem. From the graph, it can be concluded that risk rate is 5.5 times in Enmakaje, 3.5 times in Panathady and 3 times higher in Kallar. In Cheemeni and Ajanur, differences of 20% and 13% respectively are observed. But these data are not statistically significant. The prevalence of diseases in Karadka, Mooliyar and Periya is lower than in unsprayed area. In Periya, there are only two Persons with disabilities out of a total population of 9,388. There is no case of mental disability and cancer. To conclude, there are three villages with degree of disability more than the normal, and three villages with degree of disability lesser than the normal[21].

Conclusion

There individuals who has been exposed to endosulphan. are suffering from devastating diseases, most of them incurable some of the children suffering from mental retardation need continuous care and consideration, causing loss in earnings of family who are loaded with the job of taking care of the disabled. These lead to pressure on the family budget of the survivors. Instant assistance and a permanent solution on the financial reimbursement are the primary need of this group of people. Since endosulfan can cause mutation, its effects can be seen even in the future generations. A delay of two years in moustache appearance and advancement of menarche are really significant issues .But cerebral palsy, mental retardation, kidney failure and liver cancer require significant attention.

.Government don't want to make people die due to hunger but at the same time they don't want to make them die because of pesticides. They don't know how pesticides are harmful. They are ignorant.

Researches should be done on environmental issues to make the government aware about the harmful effects of chemicals on our environment. On the same side, government should take instant steps to save the people and the environment. Before giving permission for the use of any chemical, its future impacts should be taken into considerations. This review might help the researcher to take a forward steps to find out the alternative pesticide for agricultural use.

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