

Position Paper on Endosulfan 2006

Statement of Concerns

The organochlorine insecticide endosulfan is a highly toxic, ubiquitous environmental pollutant, causing long-term harm to humans and wildlife. It is widely considered to be a Persistent Organic Pollutant (POP), and was included in the initial list targeted for elimination under the Stockholm Convention. It is recognised by UNEP to be a Persistent Toxic Substance.

We believe that endosulfan should be the next pesticide added to the POPs schedule for elimination because:

- it is acutely toxic and has poisoned numerous people, livestock and wildlife
- it is an endocrine disruptor and threatens reproductive capacity, and increases risks of breast cancer
- it is volatile and contaminates environments far from where it is used
- it is persistent in the environment, and its main metabolite is even more persistent
- effective alternatives are available
- it is already deregistered or banned in many countries.

Considerable damage to human health, wildlife and the environment can be avoided by the world- wide elimination of this outdated and unnecessary chemical.

Our Recommendations:

Pesticide Action Network (PAN) Asia and the Pacific, PAN Aotearoa New Zealand, PAN Philippines and THANAL (Thanal Conservation Action & Information Network) strongly recommends that:

- **The authorities in all countries ban the use of endosulfan**
- **Governments attending the Second meeting of the CoP-2 of the Stockholm Convention ensure that notification is made on all bans or severe restrictions instituted on endosulfan to the PIC Secretariat**
- **The Government of India stops all use of Endosulfan in the country, and take full responsibility and assume liability for the severe health effects on the Kasargod communities badly effected by endosulfan used in the government owned Plantation Corporation of Kerala (PCK).**
- **All producers of endosulfan stop production of this highly persistent and hazardous pesticide**
- **Endosulfan be replaced with safer and more sustainable pest control methods**

Endosulfan's Threat to Human Health and the Environment

■ Acute Toxicity to Humans

The Intergovernmental Forum on Chemical Safety has identified endosulfan as an acutely toxic pesticide that poses significant public health problems for developing countries/ economies in transition. The U.S. EPA has classified it as Category 1b - highly hazardous. It is readily absorbed by the stomach, lungs and through the skin, and all routes of exposure pose a hazard.

Endosulfan acts primarily on the nervous system, and many cases of poisoning, including fatalities, have been reported - in Benin, Columbia, Costa Rica, Cuba, Guatemala, India, Indonesia, Malaysia, Philippines, South Africa, Sri Lanka, Sudan, Turkey, and USA. It is one of the main causative agents of acute poisoning in Central America, in southern India and other areas.

Toxic effects are aggravated by protein malnourishment and diabetes.

■ Acute Toxicity to the Environment

Endosulfan is acutely toxic to wildlife, cats, dogs, honeybees, birds, amphibia, fish and aquatic insects, crustacea, molluscs, alligators, crocodiles, turtles, plankton, soil microorganisms, and arthropods.

It has caused massive fish kills in numerous countries, including Germany, Canada, USA, Sudan, and is implicated in the worldwide decline of amphibians.

■ Endocrine Disruption

Endosulfan is known to interfere with hormonal mechanisms at very low concentrations, and existing levels of environmental contamination pose a threat to the long-term viability of animal populations, and of chronic illness and death in humans.

Endosulfan clearly exhibits oestrogenic properties, causing the proliferation of human breast cancer cells and increasing the risk of breast cancer. It significantly increases the ratio of 16-hydroxyestrone (the tumour promoting oestrogen) to 2-hydroxyestrone (the non-genotoxic oestrogen) resulting in increased breast cancer cell proliferation, development, and promotion. It interferes with mammary gland development by affecting mRNA transcriptional activity. It also causes changes to intracellular oestrogenic signalling at very low picomolar to nanomolar concentrations (e.g. 10^{-10} M), which causes rapid secretion of prolactin that in turn causes cell proliferation. Breast cancer risk is also increased by endosulfan's effect on the immune system and because it is genotoxic and mutagenic.

Endosulfan can bind to progesterone receptors, increasing the risk of miscarriage. It also inhibits testicular synthesis of androgens, and alters sex ratios. Impacts on male reproductive health include reduce sperm quality and count, testicular damage, delayed sexual maturity, and decreased penile length.

■ Other chronic effects

In laboratory studies, endosulfan damages red blood cells, thyroid, kidneys, liver, muscles, and the developing foetus. It is hepatotoxic, genotoxic, mutagenic, clastogenic, a tumour promoter, and inhibits immune function. It has produced malignant neoplasms and lymphosarcomas in rats. Behavioural and neurological changes have been observed.

Endosulfan has resulted in congenital birth defects, reproductive health problems, cancers, loss of immunity, neurological and neurobehavioural problems amongst exposed villagers in Kerala, India.

Limb deformities have been seen in salamander larvae.

■ Persistence

Endosulfan is volatile and persistent and there is evidence of widespread human, environmental and food chain contamination around the world.

The half-life of endosulfan in soil varies from 60 days (alpha-endosulfan) to 800 days (beta-endosulfan), with persistence increased by acidic conditions.

The half-life in water varies from 35-150 days.

Endosulfan sulphate is the main degradation product. It is as toxic as the parent compound but of greater persistence.

Residues of endosulfan have been detected in the environment in areas far distant from where it has been used: in air in the Arctic and Mt Everest regions, lichen, snow-water and lake-waters, rainfall and snow samples in Californian mountains, and remote European mountain lakes.

Residues have also been found in air including indoor air, rain, lakes, rivers, stream sediments, groundwater, well water, spring water, municipal water supplies, marine water and sediment, prawn ponds, lagoons, estuarine and river sediment, soil, tree bark, aquatic plants, fish, crocodile eggs, and other biota. It has been found in Argentina, Australia, Azerbaijan, Benin, Belize, Canada, Chile, China, Columbia, Costa Rica, Europe, Ghana, Greenland, Guatemala, Honduras, Hong Kong, India, Israel, Jamaica, Madagascar, Malawi, Malaysia, Mexico, New Zealand, Nigeria, North America, Pakistan, South Africa, Spain, Sudan, Tanzania, and Zambia.

Residues have also been found in food around the world, including Australia, Benin, Brazil, Colombia, Côte d'Ivoire, Croatia, Cyprus, Canada, Finland, Ghana, India, Italy, Kenya, Kuwait, Madagascar, New Zealand, Nigeria, South Africa, Tanzania, Turkey, Uganda, USA. They were found in dairy foods, meat, chicken, vegetable oil, peanuts, seeds and many different vegetables.

■ **Bioaccumulation**

The U.S. EPA considers endosulfan as having a high potential to bioaccumulate in fish, and hence may affect animals higher up the food chain. It has been found in trout from lakes in North America; and the European Union has banned importation of fish from Tanzania, Uganda and Kenya due to high levels of endosulfan.

Residues have been detected in human umbilical cord blood, placental tissue, breast milk, fat, blood and urine - in Colombia, Croatia, Egypt, India, Indonesia, Japan, Nicaragua, Pakistan, Spain, and Sub Saharan Africa.

■ **Regulatory status**

Many countries have already banned or restricted the use of endosulfan because of human health and environmental impacts.

Endosulfan is banned in Bahrain, Belize, Cambodia, Columbia, Germany, Kuwait, Netherlands, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, St Lucia, Sri Lanka, Sweden, Syria, Tonga, United Arab Emirates. Malaysia banned endosulfan in April 2005, with a phase out period that concluded in August 2005.

It is restricted in Australia, Bangladesh, Canada, Denmark, Dominican Republic, Finland, Honduras, Iceland, Indonesia, Iran, Japan, Korea, Kazakhstan, Lithuania, Norway, Panama, Russia, Serbia & Montenegro, Thailand, Taiwan, USA, UK, Venezuela.

In the UNEP-GEF Regional-based Assessment of Persistent Toxic Substances (PTS), it is rated as follows:

- Indian Ocean region - "regional concern"
- North American region - "regionally specific PTS"
- Mediterranean region - "local concern"
- Sub Saharan Africa - PTS of highest concern after DDT
- E&W South American - emerging concern
- European region - proposed possible priority hazardous substance
- SE Asia and S Pacific region - regional concern, with long-term effect on the structure of the aquatic ecosystem
- Central America and Caribbean - one of the most important PTS of emerging concern.

In summary, endosulfan is recognised as being unacceptably hazardous to human health and the environment in many regions of the world. Its continuing use in other regions jeopardises wildlife

populations, environmental integrity and human health everywhere because of its volatility, which enables it to spread around the globe, and its persistence. It is a leading cause of poisonings from pesticides, and in some communities has left a legacy of deformity and malfunction. It is a pesticide that is no longer needed for there are acceptable alternatives for all current uses.

Endosulfan Poisoning in Kasargod, Kerala, India

More than twenty years of aerial spraying of endosulfan for cashew nut production, in the government owned Plantation Corporation of Kerala, has been linked to massive health problems—from horrendous birth defects to cancers and deaths—in the communities around Kasargod District, Kerala. People residing in the villages within the plantation have been afflicted with different kinds of illnesses which, according to the villagers, were not present before the cashew nut plantation started their operations. People also noticed the death of fishes, honeybees, frogs, birds, chicken and even cows. Through the commitment and tenacity of the villagers, local journalists, doctors and the support of THANAL (Thanal Conservation Action & Information Network) and the Delhi-based Center for Science and Environment (CSE) the case gained greater notoriety.

Between January 18-22, 2002, PAN AP organised a fact-finding mission led by Dr. Romeo Quijano, Professor in the Department of Pharmacology and Toxicology, at the College of Medicine, University of the Philippines Manila. THANAL had requested PAN AP to provide technical expertise in order to obtain a more scientific validation of the poisoning cases in Kerala.

Summary findings from the Fact-Finding Mission and Report undertaken by Dr. Romeo F. Quijano, facilitated by Pesticide Action Network Asia and the Pacific.

- The illnesses observed are to be expected from the known intrinsic toxicologic properties of endosulfan. The preponderance of neurologic and mental illnesses among the reported health problems is compatible with the fact that endosulfan is a known neurotoxicant, belonging to a group of highly toxic organochlorine chemicals. Endosulfan blocks the inhibitory receptors of the central nervous system, disrupts the ionic channels, and destroys the integrity of the nerve cells. Acute toxic effects include dizziness and vomiting, hyperactivity, tremors, lack of coordination, and convulsions. Chronic exposure may result in permanent damage to the nervous system which may manifest in various kinds of neurologic diseases. Apart from its capacity to directly damage the nervous system, endosulfan is also an endocrine disruptor. Even low levels of exposure during pregnancy could result in various forms of endocrine disrupting effects in the offspring, including mental retardation, reproductive organ anomalies, developmental disorders, behavioural disorders later in life, and many others.
- There is no evidence that other environmental toxicants that might possibly explain the observed health problems are present in the affected areas. There has been no other pesticide, not even household pesticides, that have been used except endosulfan. There are no industrial activities at or near the areas affected which might indicate possible contamination by industrial pollutants, like lead, mercury, cadmium, polyaromatic hydrocarbons, etc, that might confound the causation of the health problems in the affected areas. Furthermore, the villages affected were too far away from the nearest city where pollution by other toxicants might possibly occur. Ionizing radiation is also an unlikely cause since there is no identifiable source.
- There is clear time and geographic association between the occurrence of the health problems and the aerial spraying of endosulfan. The people's claim that the health problems occurred and gradually accumulated during the period of aerial spraying of endosulfan has not been disputed. Cases of cancer, developmental anomalies, reproductive disorders, neurologic diseases, and the other serious illnesses were practically non-existent before the advent of endosulfan aerial spraying.
- There is corroborating evidence of adverse effects on animals and the environment which are attributable to endosulfan. The reports on fish kills and dwindling populations of honeybees, frogs, birds, and other animals soon after the aerial spraying of endosulfan started have not been disputed. Cows and chicken were also observed to die of mysterious causes. People were also complaining that their domestic animals had suffered miscarriages, bleeding, infertility, stunting of growth and deformities. These effects can be expected as a result of exposure to endosulfan.

■ People's experiences and testimonies from the affected villages had indicated that endosulfan was causing health and environmental problems. The people in the affected villages had been seeing the increased incidence of diseases and environmental problems only since the plantation started its operations. Many other villages in Kasargod have also reported such health problems at various times during the years of endosulfan aerial spraying.

Stop Endosulfan!

Due to all of the above mentioned reasons, Pesticide Action Network (PAN) Asia and the Pacific, PAN Aotearoa New Zealand, PAN Philippines and THANAL (Thanal Conservation Action & Information Network) strongly recommends that:

- **The authorities in all countries ban the use of endosulfan**
- **Governments attending the Second meeting of the Conference of the Parties (CoP-2) of the Stockholm Convention ensure that notification is made on all bans or severe restrictions instituted on endosulfan to the PIC Secretariat**
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