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"IMPACT OF ENDOSULFAN PESTICIDE ON AGRICULTURE"

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ABSTRACT

The wide range of pesticide and insecticide had been reported to contaminate terrestrial and aquatic environments worldwide. Endosulafan is a chlorinated hydrocarbon insecticide which acts as a poison to a wide variety of insects and mites on contact. Endosulfan can travel long distances from where it is used. It commonly contaminates soil, air, water and plants. It is extremely toxic to fish and aquatic invertebrates and causing long-term harm to humans and wildlife. Thus, it is widely considered to be a Persistent Organic Pollutant. Endosulfan as having a high potential to bioaccumulation in fish, and hence may affect animals higher up the food chain. Although, it is banned in many countries it is still produced and used in India. Kasargod is a bad example where all plant and animal communities badly affected by endosulfan used in the government owned Plantation. Considerable damage to human health, wildlife and the environment can be avoided by the world- wide elimination of this toxic chemical. It is need of the hour.

Thus, the present study makes an attempt to give geographical perspective of the use of endosulfan and its role in environmental degradation as it is a prime matter of concern in environmental geography. This study is based on the secondary data and published sources. Simple statistical methods such as percentages, averages etc have been applied for the analysis.

Key words: Endosulfan,

Health effects of endosulfan

Introduction

Endosulfan is a man-made insecticide. It is used for control of a number of insects on such food crops as grains, tea, fruits, and vegetables and on such nonfood crops as tobacco and cotton. It is also used as a wood preservative.

Endosulfan is sold as a mixture of two different forms of the same chemical (referred to as alpha- and beta-endosulfan). It is a cream-to-brown-colored solid that may appear crystalline or be in flakes. It has a distinct odor similar to turpentine. Endosulfan does not burn.

Endosulfan enters air, water, and soil when it is manufactured or used as a pesticide. Endosulfan is often applied to crops using sprayers. Some endosulfan in the air may travel long distances before it lands on crops, soil, or water. Endosulfan on crops usually breaks down within a few weeks. Endosulfan released to soil attaches to soil particles. Endosulfan found near hazardous waste sites is usually found in soil. Some endosulfan in soil evaporates into air, and some endosulfan in soil breaks down. However, it may stay in soil for several years before it all breaks down. Rain water can wash endosulfan that is attached to soil particles into surface water. Endosulfan does not dissolve easily in water. Most endosulfan in surface water is attached to soil particles floating in the water or attached to soil at the bottom. The small amounts of endosulfan that dissolve in water break down over time. Depending on the conditions in the water, endosulfan may break down within 1 day or it may take several months. Some endosulfan in surface water evaporates into air and breaks down. Because it does not dissolve easily in water, only very small amounts of endosulfan are found in groundwater (water below the soil surface; for example, well water). Animals that live in endosulfan-contaminated waters can build up endosulfan in their bodies. The amount of endosulfan in their bodies may be several times greater than in the surrounding water.

Medical tests for exposure to endosulfan

Endosulfan and its breakdown products can be measured in your blood, urine, and body tissues if you have been exposed to a large amount. Tests to measure endosulfan in such bodily tissues or fluids are not usually available at a doctor's office because special equipment is needed for measuring endosulfan and its breakdown products. However, a sample taken in the doctor's office can be properly packed and shipped to a special laboratory if necessary. Because endosulfan leaves the body fairly quickly, these methods are useful only for finding exposures that have occurred within the last few days. At this time, these methods can only be used to prove that a person has been exposed to endosulfan. The test results cannot be used to predict if you will have any adverse health effects. Exposure at the same time to other chemicals at hazardous waste sites could cause some confusion in understanding these results.

Endosulfan is an off-patent organochlorine insecticide and acaricide that is being phased out globally. The two isomers, endo and exo, are known popularly as I and II. Endosulfan sulfate is a product of oxidation containing one extra O atom attached to the S atom. Endosulfan became a highly controversial agrichemical due to its acute toxicity, potential for bioaccumulation, and role as an endocrine disruptor. Because of its threats to human health and the environment, a global ban on the manufacture and use of endosulfan was negotiated under the Stockholm Conventionin April 2011. The ban will take effect in mid-2012, with certain uses exempted for five additional years. More than 80 countries, including the European Union, Australia, New Zealand, several West African nations, the United States, Brazil, and Canada had already banned it or announced phase-outs by the time the Stockholm Convention ban agreed upon. It is still used extensively in India, China, and few other countries. It is produced by Makhteshim Agan and several manufacturers in India and China.

Uses:

Endosulfan has been used in agriculture around the world to control insect pests including whiteflies, aphids, leafhoppers, Colorado potato beetles and cabbage worms. 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.

Health effects:

Endosulfan is one of the most toxic pesticides on the market today, responsible for many fatal pesticide poisoning incidents around the world. Endolulfan is also a xenoestrogn a synthetic substance that imitates or enhances the effect of estrogens and it can act as eddocrine disruptor, causing reproductive and developmental damage in both animals and humans. Whether endosulfan can cause cancer is debated. With regard to consumers intake of endosulfan from residues on food, the Food and Agriculture Organization of United Nations has concluded that long-term exposure from food is unlikely to present a public health concern.

Toxicity

Endosulfan is acutely neurotoxic to both insects and mammals. Including humans The US EPA classifies it as Category I: Highly Acutely Toxic" based on a LD value of 30 mg/kg. It is a GABA-gated chioride channel antagonist. And as class II "Moderately Hazardous" based on a rat LD of 80 mg/kg. It is a GABA-gated chloride channel antagonist. And a Ca^{2+}, Mg^{2+} ATPase inhibitor. Both of these enzymes are involved in the transfer of nerve impulses. Symptoms of acute poisoning include hyperactivity, tremors, convulsions, lack of coordination, staggering, difficulty breathing, nausea and vomiting, diarrhea, and in serve cases, unconsciousness. Doses as low as 35 mg/kg have been documented to cause death in humans, and many cases of sublethal poisoning have resulted in permanent brain damage. Farm workers with chronic endosulfan exposure are at risk of rashes and skin irritation. EPA's acute reference dose for ditary exposure to endosulfan is 0.015 mg/kg for adults and 0.0015 mg/kg for children. For chronic dietary exposure, the EPA references doses are 0.006 mg/(kg.day) and 0.0006 mg(kg.day)for adults and children, respectively.

Reproductive and developmental effects

Serval studies have documented that endosulfan can also affect human development. Researches studying children from many villages in Kasaragod District, Kerala, India, have linked endosulfan exposure to delays in sexual maturity among boys. Endosulfan was the only pesticide applied to cashew plantations in the villages for 20 years, and had contaminated the village environment. The researchers compared the villagers to a control group of boys from a demographically similar village that lacked a history of

endosulfanpollution. Relative to the control group. The exposed boys had high levels of endosulfan in their bodies, lower levels oftestosterone, and delays in reaching sexual maturity. Birth effects of the male reproductive system, including cryptorchidism, were also more prevalent in the study group. The researchers concluded, 'our study results suggest that endosulfan exposure in male children may delay sexual maturity and interfere with sex hormone synthesis." Increased incidents of cryptorchidism of cryptorchidism have been observed in other studies of endosulfan exposed propulations.

A 2007 study by the California Department of Public Health found that women who lived near farmed fields sprayed with endosulfan and the related organochloride persticide dicofol during the first eight weeks of pregnancy are several times more likely to give birth to children with autism. This is the first study to look for an association between endosulfan and autism, and additional study is needed to confirm the connection. A 2009 assessment concluded that epidemiology and rodent reproductive toxicity in rats occurs only at endosulfan doses that cause neurotoxicity

Endosulfan

Endosulfan is a DDT-era insecticide that persists in the environment and in our bodies. EPA data show that all of us are routinely exposed to small amounts of endosulfan in the food we eat, with young children receiving the largest doses. Studies of populations exposed to endosulfan have been published suggesting that endosulfan can increase the risk of autism, delay puberty in boys, and cause birth defects of the male reproductive system.

Human Health Harms

Endosulfan attacks the central nervous system, causing overstimulation and a range of health harms. Acute exposure to endosulfan causes headaches, nausea and vomiting, seizures, and in extreme cases, unconsciousness and death. The EPA classifies endosulfan in its most extreme toxicity category (highly acutely toxic) because relatively small doses prove lethal in laboratory studies.

Endousulfan related deaths and debilitation are common is the developing world, where endosulfan is cheap but personal protective equipment is expensive or even impossible to obtain. Examples include thirty-seven farmers dying in Benin, two boys dead in South Africa, flower workers poisoned in Colombia, and villagers in Philippines and India poisoned by the toxic persticde.

Ending Endosulfan

US EPA determined in 2010 that endosulfan could not be used safely, and announced that it was phasing out all uses of the chemical in the US by 2016. Brazil and several other countries followed sult, announcing phase out plans for the chemical.

On the Internationa front, the Stockholm Convention on Persistent Organic Pollutants agreed in April 2011 that endosulfan shoud be added to the list of chemicals banned globally under the treaty, In June of 2011, endosulfan was also added to another international treaty, the Rotterdam Convention, which requires government-to-government notification when dangerous pesticides and other chemicals cross international borders.