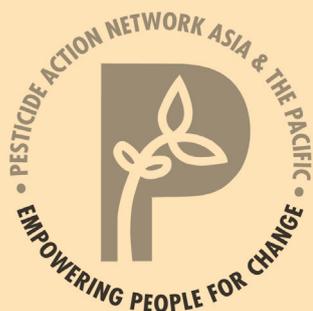


Monocrotophos



(Photo courtesy of Bremen Yong/RSP0)

In oil palm estates, monocrotophos is used for trunk injection to control bagworms. All over Asia, it is responsible for thousands of poisonings.



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Meriel Watts, PhD
October 2011

Trade names

Agrodrin, Apadrin, Azodrin, BM Azoforce, Bilobrin, Bullet 55, Crotophosdrin, Crotos, Crisodrin, Efacron, Glore Phos 36, Hazodrin, Inject, Kadett, Krotofos, Lucadrin, Macabre, Megatron, Mono 55, Monocil, Monocron, Monodrin, Monofos, More-Phos, Mosum, Nuvacron, Phoskill, Pilladrin, Plantdrin, Susvin, etc.

Uses

Insecticide. Broad-spectrum, fast-acting, contact and systemic organophosphate. Used to control a wide range of pests, including sucking, chewing and boring insects such as aphids, caterpillars, bollworm, mites, moths, jassids, budworm, scale, stem borer, and locusts.

In India, most use is on cotton, rice, pulses, groundnuts, vegetables (especially tomato and brinjal/aubergine) and fruits (especially mango and grapes); also chillies, cardamom, coconut, coffee, tea, castor, citrus, olives, maize, sorghum, sugar cane, sugar beet, pea, potatoes, soybeans, cabbage, mustard, onion, pepper, ornamentals and tobacco.

In Malaysia, it is used for trunk injection in coconut palms, and oil palms to control bagworm moths.

Classifications and risk statements

WHO: Class Ib highly hazardous

US EPA: Category I highly toxic

EU: very toxic by inhalation and if swallowed

Regulatory status

International

Included in Annex III of the Rotterdam Convention on Prior Informed Consent.

WHO and FAO recommend global phase out of monocrotophos and urge

countries to consider banning it in compliance with Articles 3.5 and 7.5 of the International Code of Conduct on the Distribution and Use of Pesticides. Article 3.5 states “Pesticides whose handling and application require the use of personal protective equipment that is uncomfortable, expensive or not readily available should be avoided, especially in the case of small-scale users in tropical climates”; and article 7.5 states “Prohibition of the importation, sale and purchase of highly toxic and hazardous products, such as those included in WHO Classes Ia and Ib, may be desirable if other control measures or good marketing practices are insufficient to ensure that the product can be handled with acceptable risk to the user.”

National

Illegal to import it into at least 46 countries (as notified to the Rotterdam Convention). Countries that do not permit use include Argentina, Australia, Brazil, Cambodia, Canada, China, Dominican Republic, European Union, Indonesia, Iran, Jordan, Kuwait, Laos, Lebanon, Libya, New Zealand, Pakistan, Philippines, Qatar, Saudi Arabia, South Africa, Sri Lanka, Syria, Thailand, USA, Vietnam and Yemen.

Banned for use on vegetables in India in 2006 due to high residue levels, but easily available and widely used on them.

Although use is banned in China, it is still occurring; residues have been found in supermarket vegetables in 2011. PAN AP’s Community Monitoring found illegal use in Cambodia.

Ongoing illegal use and porous borders in many Asian countries mean that all production and use of this pesticide should be stopped to protect farmers and their families.

International standards

On PAN International's list of Highly Hazardous Pesticides (2010) for global phase-out, because of its acute toxicity and toxicity to bees.

Manufacture

Out of patent, therefore generically manufactured, especially in India and China although production is supposed to be banned in the latter.

Health effects

Highly acutely toxic by all routes of exposure. Easily absorbed.

Poisonings

One of the main agents for farmer suicides in India, where the annual average reported cases was 17,366 in 2007, but thought to be up to 126,000 annually.

Organophosphates cause depression and this is a major risk factor for suicide. It is the most commonly consumed insecticide in India, with a case fatality rate of 35% recorded, second only to methyl parathion, and causing more than half of the deaths from pesticide poisoning in Andhra Pradesh. In Sri Lanka, the ban of monocrotophos and endosulfan has reduced the number of deaths from suicide.

Also one of the most common causes of occupational poisoning in the Indian states of Andhra Pradesh and Gujarat.

Monocrotophos has been linked to significant occupational poisoning in Indonesia, Philippines, Egypt, Brazil, and Central America.

Acute toxicity

Signs and symptoms of poisoning include bloody or runny nose, coughing, chest discomfort, difficulty breathing, and wheezing; pain in the eyes, tears, constriction of the pupils, and blurred vision; pallor, nausea, vomiting, diarrhoea, abdominal cramps, headache, dizziness, salivation, sweating and confusion; lack of coordination, slurred speech, loss of reflexes, weakness, fatigue, involuntary muscle contractions, twitching, tremors of the tongue or eyelids, and eventually paralysis of the body extremities and the respiratory muscles. Severe cases

may involve involuntary defecation or urination, psychosis, irregular heartbeat, unconsciousness, convulsions and coma. Respiratory failure or cardiac arrest may cause death. The ingestion of only 120mg can be fatal.

Chronic toxicity

Neurotoxicity: like most organophosphates, it can cause neurobehavioural problems and delayed neuropathy.

Cancer: although not classified as a carcinogen, there is evidence it is mutagenic, has caused DNA damage, chromosomal damage in human lymphocytes, and the growth of human breast cancer cells. It is, therefore, potentially carcinogenic, with chronic exposure more damaging than acute exposure.

Endocrine disruption: evidence of endocrine disruption in mice and fish, including oestrogenicity.

Reproductive and developmental toxicity: interruption in oestrous cycle, decrease in healthy follicles and increase in atretic follicles in mice; in rats decreased fertility, depressed lactation; some evidence of teratogenicity; evidence of disruption of reproductive endocrine control in fish.

Immunotoxicity: immunotoxic in birds and rats; also toxic to human lymphocytes.

Metabolic effects: repeated exposure may induce type II diabetes.

Environmental and agroecological effects

Toxicity

Aquatic: very toxic to aquatic invertebrates; high hazard to aquatic invertebrates from run off and spray drift; toxic to shrimps and crabs; moderately toxic to fish. According to FAO must be labelled as a marine pollutant.

Birds: very toxic to birds; one of the most toxic insecticides for birds.

Mammals: very toxic to mammals. Poisoning incidents include mass bird kills (USA, India, EU, Australia, Argentina), and cows from eating sprayed foliage (India). Has caused significant damage to wildlife, particularly birds and hares in Hungary.

Agroecological disruption

Bees: very toxic to honey bees.

Terrestrial invertebrates: very toxic to beneficial insects including lacewings and other predators; not compatible with IPM.

Soil organisms: moderately toxic to earthworms.

Resistance: at least 21 pests have developed resistance to monocrotophos, including cotton bollworm, diamondback moth, whitefly, brown planthopper on rice, and house mosquito.

Environmental fate and contamination

Soil: breaks down rapidly and is not persistent.

Aquatic: mobile in the soil and leaching to ground water is possible.

Bioaccumulation: not bioaccumulative.

Alternatives

There are numerous cultural, mechanical and biological solutions to pest control, as well as natural sprays that can be used instead of monocrotophos depending on the pest and the situation.

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