GUIDE TO NEW POPs: CHLORPYRIFOS

April 2025

Introduction

The POPs Review Committee has recommended three new chemicals be listed for global elimination at the 2025 Stockholm Convention COP: chlorpyrifos, medium-chain chlorinated paraffins (MCCPs), and long-chain perfluorocarboxylic acids (LC-PFCAs). IPEN's guides briefly describe why each of these hazardous chemicals should be globally banned, without exemptions.

What is chlorpyrifos?

Chlorpyrifos is a broad-spectrum chlorinated organophosphate (OP) insecticide used for many purposes, including as pest control in agriculture for a wide range of crops, in households, in parks, on golf courses, on lawns, as a wood treatment, and to control mosquitos.

Chlorpyrifos was first produced commercially in 1965 by Dow Chemical Company, and its current use is estimated at approximately 50,000 tonnes per year. Over 300 suppliers of products containing chlorpyrifos were identified globally during the development of the Risk Management Evaluation, a majority of which are located in China, with smaller numbers of suppliers identified in India, USA, EU, and other countries. China and India are two of the biggest producers of chlorpyrifos globally, with large amounts being exported for use in other countries. A global report on HHPs by IPEN and accompanying reports from its NGO partners on their Country Situations show that chlorpyrifos is one of the most widely used pesticides in many countries. It is imported and used in large volumes under many different brand names and formulations and is still often sold as co-formulations, for example, with pyrethroid insecticides.

Direct exposure to chlorpyrifos occurs in many ways during production, preparation, use, and disposal and through cleaning of contaminated containers and equipment. In addition, there are many sources of indirect exposure to chlorpyrifos, for example, when people enter fields after application, through spray drift, and from contamination of the environment, drinking water, and food. Chlorpyrifos has been detected in breast milk sampled from women both in agricultural and non-agricultural areas in several parts of the world. Farmworkers and their families are at risk of exposure to chlorpyrifos and other pesticides that are taken into workers' homes through contaminated clothing and dust.
Health impacts from chlorpyrifos exposure have been documented in many countries.
There is a significant cost to society and public health from the continued use of chlorpyrifos associated with lost IQ and other neurodevelopmental harm, including loss of intellectual potential and lifetime productivity, health care costs, and costs associated with care for those with resultant developmental and learning disabilities.

Chlorpyrifos meets the Stockholm Convention criteria for listing

Chlorpyrifos harms the nervous system and is designed to be highly toxic to insects, including bees and other pollinators. It is also highly toxic to many aquatic organisms such as fish, frogs, and crustaceans, to soil-living organisms such as earthworms, and to many terrestrial species, especially birds. Moreover, it is toxic to mammals and hinders normal development of the nervous system. For example, in humans, prenatal and childhood chlorpyrifos exposures are linked to attention deficit hyperactivity disorder and impaired mental- and motor-skill development in young children. It can also cause neurological damages in adults and has endocrine disrupting properties.

Because of the toxic properties of chlorpyrifos, it meets the criteria for being a Highly Hazardous Pesticide and is included on the Pesticide Action Network International List of Highly Hazardous Pesticides.

Monitoring data show that chlorpyrifos is a ubiquitous pollutant that is present in all continents and in all environmental compartments, including soil, sediment, air, fresh water, salt water, rain, snow, sea ice, and biota. Chlorpyrifos has been detected both in areas close to where it is produced and used and in remote locations, confirming its long-range transport. It has been detected in Arctic air, snow, lake sediment, fresh water, sea water, marine fog, and ice and in various biotic compartments, including traditional sources of food for Indigenous Peoples such as fish, caribou, and seals. It has also been detected in air, ice, and sea-ice meltwater in Antarctica and in lake sediments on the Tibetan plateau.

Chlorpyrifos degrades slowly and has a half-life ranging from a few days to several years depending on many factors such as ecosystem type, soil or sediment characteristics, and temperature. This means that chlorpyrifos will persist in colder regions for a considerable amount of time, as verified by its detection in dated sediment cores in Arctic and sub-Arctic lakes.

It bioaccumulates in aquatic and air-breathing organisms, and its detection in apex predators in the Arctic indicates biomagnification across trophic levels. Due to its high toxicity, even moderate bioaccumulation is of serious concern since adverse effects are seen at low concentrations.

Proposed Action from the POPRC

The POPs Review Committee has concluded that chlorpyrifos is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and environmental effects such that global action was warranted. They have recommended listing chlorpyrifos in Annex A with the following specific exemptions:

- Plant protection for the following:
  - Control of rice planthoppers, rice stemborers and rice leaf rollers in rice.
  - Control of scale insects in citrus.
  - Underground pest control of grubs on peanuts.
  - Underground pest control of sugarcane beetles on sugarcane.
  - Control of locusts.
- Control of ticks in cattle.
- Wood preservation against borers and termites in building foundations.

Alternatives exist for all uses of chlorpyrifos, no alternatives are warranted

The POPRC Risk Management Evaluation notes that a prohibition of production, use, import and export by listing in Annex A without exemptions would represent the most successful control measure in reducing emissions and exposure and reducing risks to human health and the environment. It also provides information that supports the feasibility of a complete ban on chlorpyrifos, since it has already been successfully phased out in countries representing a wide range of climates, economic development levels, and specific chlorpyrifos applications.

The most effective measure to protect human health and the environment is to replace chlorpyrifos with non-chemical alternatives. A range of such alternatives are available, such as sustainable agroecological and organic agricultural practices, biological control systems, and botanical preparations, as well as physical barriers and hygiene practices. Details on the information on non-chemical alternatives submitted to the POPRC can be found in UNEP/POPS/POPRC.20/INF/5.

Several resources on agroecology as a feasible and effective non-chemical alternative are available on the Pesticide Action Network International website. They also provide several specific technical briefings on non-chemical alternatives to chlorpyrifos, including alternatives to the uses recommended for exemptions by POPRC.

The HHP Alliance

Listing chlorpyrifos in Annex A of the Stockholm Convention without exemptions would be in line with commitments made by Parties to phase out Highly Hazardous Pesticides in other global agreements.

In 2023, governments and stakeholders participating in the Fifth Session of the International Conference on Chemicals Management (ICCM5) established the Global Framework on Chemicals – For a planet free of harm from chemicals and waste (GFC). This was accompanied by a resolution endorsing the formation of a Global Alliance on Highly Hazardous Pesticides. The resolution invited all interested stakeholders to become members. FAO in collaboration with UNDP, UNEP, and WHO is now moving forward to operationalize the Alliance.

The goal of the Alliance is to take effective measures to phase out highly hazardous pesticides in agriculture where the risks have not been managed and where safer and affordable alternatives are available; and to promote transition to and make available those alternatives.

Key actions that the Alliance will support include

a. Raising awareness of the human health and environmental impacts of highly hazardous pesticides;
b. Identifying and promoting safer and more sustainable agricultural practices, including agroecology, integrated pest management, and the use of non-chemical alternatives;
c. Sharing examples of countries having successfully phased out highly hazardous pesticides;
d. Supporting low- and middle-income countries in their efforts to strengthen national regulatory frameworks and phase out highly hazardous pesticides in agriculture where the risks have not been managed and where safer and affordable alternatives are available; and to promote transition to and make available those alternatives;
e. Mobilizing support for farmers and agricultural workers in their transition from the use of highly hazardous pesticides, where the risks have not been managed, towards less hazardous alternatives; and
f. Supporting the agrifood supply chain in a transition from highly hazardous pesticides to safer and affordable alternatives where available and where the risks have not been managed.

In addition, the GFC includes as one of its targets that by 2030, stakeholders have effectively prevented all illegal trade and traffic of chemicals and waste.

A resolution at the sixth session of the United Nations Environment Assembly (UNEA-6) in 2024 further encouraged stakeholders, including Member States, to take effective measures to phase out highly hazardous pesticides in agriculture where the risks have not been managed and where safer and affordable alternatives are available, and to promote transition to and make available those alternatives. The resolution also invited Member States and all other relevant stakeholders to become members of the Alliance and to continue to cooperate and coordinate in efforts to prevent illegal trafficking in highly hazardous pesticides.

Recommendations

As noted in the Risk Management Evaluation, listing chlorpyrifos in Annex A without exemptions would be most the successful control measure in reducing emissions and exposure and reducing risks to human health and the environment. The information provided by Parties and stakeholders about alternatives shows that this is a feasible way forward.

In addition, to ensure that chlorpyrifos stockpiles and articles contaminated with chlorpyrifos are managed in a manner protective of human health and the environment, they should be destroyed using non-combustion techniques. These techniques include Gas-Phase Chemical Reduction, Base catalyzed decomposition (BCD), and Supercritical Water Oxidation.