CHLORPYRIPHOS:

SITUATION IN THE WORLD AND KAZAKHSTAN

What is chlorpyrifos?

Chlorpyrifos, also known as Chlorpyrifos ethyl, is an organophosphate pesticide that has been used on crops, animals, and buildings, and in other settings, to kill a number of pests, including insects and worms. It acts on the nervous systems of insects by inhibiting the acetylcholinesterase enzyme.

Uses of chlorpyrifos

Chlorpyrifos is used on agricultural food and feed crops, cattle ear tags, golf course turf, industrial plants and vehicles, non-structural wood treatments including processed wood products, fence posts and utility poles, and to control public health pests such as mosquitoes and fire ants.

Why is chlorpyrifos a concern?

Chlorpyrifos is an insecticide first marketed in 1965 that for the past 20 years has been increasingly restricted in the United States and European Union.

People are exposed through residues on food and in drinking water, and by toxic spray drift from pesticide applications.

Farmworkers are exposed to it from mixing, handling, and applying the pesticide; as well as from entering fields where chlorpyrifos was recently sprayed.[1]

According to WHO Recommended Classification of Pesticides by Hazard, chlorpyrifos is considered as moderately hazardous (class II) technical grade active ingredient in pesticides.[2]

Exposure to small amounts of chlorpyrifos can cause runny nose, tears, and increased saliva or drooling. People may sweat, and develop headache, nausea, and dizziness. More serious exposures can cause vomiting, abdominal muscle cramps, muscle twitching, tremors and weakness, and loss of coordination.[3]

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[1] Chlorpyrifos. The toxic pesticide harming our children and environment [Electronic source] // Earthjustice. URL: https://earthjustice.org/features/chlorpyrifos-what-you-need-to-know (access date 02.07.2022)

[2] The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification. // WHO Official website. URL: https://www.who.int/publications/i/item/9789240005662 (access date 02.07.2022)

[3] Chlorpyrifos. General Fact Sheet [Electronic source] // National Pesticide Information Center. URL: http://npic.orst.edu/factsheets/chlorpgen.html (access date 02.07.2022)

Embryos and newborns are more sensitive to organophosphates than adults. Early exposure to chlorpyrifos has been associated with weight loss, motor impairment, learning and attention disorders – girls are more affected than boys.

Researchers studied the blood of women who were exposed to chlorpyrifos and the blood of their children from birth for three years. Children who had chlorpyrifos in their blood had more developmental delays and disorders than children who did not have chlorpyrifos in their blood. Exposed children also had more attention deficit disorders and hyperactivity disorders. [4]

Chlorpyrifos and environment

Chlorpyrifos can be released into the air from both soil and water. It enters the water mainly with runoff from farms and fields and with precipitation.

Chlorpyrifos is one of the most persistent organophosphate pesticides, and unlike most of them, which quickly decompose in the environment, this substance remains in soil for up to 120 days (according to other sources - up to 2 years), and in water for more than 2 months.

Chlorpyrifos is very toxic to fish and aquatic invertebrates. It may build up in the tissues of fish and other animals that eat smaller animals. This is known as bioaccumulation.

Chlorpyrifos is very toxic to bees. It can poison non-target insects for up to 24 hours after it is sprayed.

Legislative restrictions

On December 6, 2019, the European Union (EU) announced that it will no longer permit sales of chlorpyrifos after January 31, 2020. [5]

On Aug. 18, 2021, the U.S. Environmental Protection Agency announced that it will end use of chlorpyrifos on all food products nationwide.[6]

Corteva Agriscience, one of the biggest agricultural companies in the U.S., in July 2020, announced that it would phase the product out this year.[7]

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[4] Chlorpyrifos. General Fact Sheet [Electronic source] // National Pesticide Information Center. URL: http://npic.orst.edu/factsheets/chlorpgen.html (access date 02.07.2022)

[5] European Union to Ban Chlorpyrifos after January 31, 2020. [Electronic source] //United States Environmental Protection Agency. Official website. URL: https://www.natlawreview.com/article/european-union-to-ban-chlorpyrifos-after-january-31-2020 (access date 02.07.2022).

[6] Solomon Gina. The EPA is banning chlorpyrifos, a pesticide widely used on food crops, after 14 years of pressure from environmental and labor groups [Electronic source] //The Conversation. August 24, 2021. URL: https://bit.ly/3yvnGnt (access date 02.07.2022)

According to the *PAN International Consolidated List of Banned Pesticides*, chlorpyrifos is banned in 39 countries, as of May 2022. [8]

Chlorpyrifos: situation in Kazakhstan

On November 3, 2019 in Shymkent a 4-year-old and a one-year-old boys died as a result of poisoning with an unknown substance. Similar case occurred on February 13, 2020 when an eight-month-old baby died as a result of poisoning with an unknown substance.[9]

Forensic experts determined the cause of death. The exterminator carried out the pest control service using imidacloprid which is used in agriculture sector as an insecticide (neonicotinoid).

The exterminator was detained, and the case was investigated under Article 304 of the Criminal Code of the Republic of Kazakhstan "Violation of sanitary rules or hygienic regulations".

"Imidacloprid", along with "Chlorpyrifos" and "Tetramethrin" is still widely used in some CIS countries in agriculture sector as an insecticide (neonicotinoid).

Experts believe that 99 percent of cases of poisoning during the usage of these products are occurred due to their improper storage or safety violation, and this may lead to poisoning of children and pets.

Greenwomen has sent inquiries to the Ministry of Health (Committee for Sanitary and Epidemiological Control), the Ministry of Agriculture (Committee for State Inspection in the Agro-Industrial Complex), the Ministry of Trade and Integration (Committee for Consumer Rights Protection), and the Ministry of Ecology, Geology and Natural Resources (Committee for Environmental Regulation and Control) requesting to provide information on use of chlorpyrifos in Kazakhstan.

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[7] Fu Jessica. Pesticide giant drops chlorpyrifos, following years of controversy, lawsuits, and bans [Electronic source] // The Counter. July 2, 2020 . URL: https://bit.ly/3nwpqXg (access date 02.07.2022)

[8] PAN International Consolidated List of Banned Pesticides. [Electronic source] // PAN International. Official website. URL: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ (access date 02.07.2022).

[9] Гибель троих детей в Шымкенте: задержан подозреваемый. [Электронный ресурс] // Казахстанская правда. 19 апреля 2020 г. URL: https://kazpravda.kz/n/gibel-troih-detey-v-shymkente-zaderzhan-podozrevaemyy/ (дата обращения 02.07.2022)

The Committee for Sanitary and Epidemiological Control of Ministry of Healthcare in its reply informs that imidacloprid – sold under trade names "*Confidor", "Kohinor", "Admire", "Gaucho", and "Prothor"* – is a neonicotinoid and is considered as moderately hazardous (class II) technical grade active ingredient in pesticides. "36 products containing imidacloprid are registered in the Unified Register of Certificates of State Registration of Products of the Eurasian Economic Union; most of them are used in mixtures with other active ingredients," the Committee reports.

"Products for disinfestation and deratization that have passed the state registration for compliance with the Uniform Sanitary Requirements and that are included in the register have the right to unhindered movement throughout the territory of the entire Eurasian Economic Union," the Committee informs in its response.

Greenwomen in its inquiry to the Ministry of Agriculture is asking if Kazakhstan imports the pesticides containing chlorpyrifos; what quantities Kazakhstan received, and which companies are importing these products to Kazakhstan.

The State Inspection Committee for Agro-Industrial Complex of the Ministry of Agriculture of the Republic of Kazakhstan provided the following information:

- Insecticide "Chlorcyrin" 55% e.c. (emulsifiable concentrate) (contains chlorpyrifos, 500 g/l and cypermethrin, 50 g/l) - 1,055,489.52 kg, supplier country – Belgium;

- NUKER PRO, e.c. (contains chlorpyrifos, 500 g/l and cypermethrin, 50 g/l) - 22,344 kg, supplier country – China;

- Acaricide "Cardinal", e.c. (contains chlorpyrifos 500 g/l and cypermethrin 50 g/l) – 5040 kg, supplier country – China.

Committee informs that '16 products containing chlorpyrifos are registered in the list of pesticides allowed for manufacturing (formulation), import, storage, transportation, sale and use on the territory of the Republic of Kazakhstan'.

According to the PAN International Consolidated List of Banned Pesticides, 39 countries banned the use of chlorpyrifos products, as of May 2022.[10]

Kazakhstan ratified Stockholm Convention on June 7, 2007.

[10] PAN International Consolidated List of Banned Pesticides. [Electronic source] // PAN International. Official website. URL: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ (access date 02.07.2022)

The country, however, continues to use the preparations that contain one or more active substances – chlorpyrifos included – that are in the PAN International Consolidated List of Banned Pesticides.

It looks like that the agriculture sector in Kazakhstan will continue to use chlorpyrifos. The companies that work in agriculture sector of Kazakhstan have to obtain the official certificate of registration from the Committee regarding the pesticides they use. The list provided by the Committee shows that the companies intend to use in Kazakhstan the products containing chlorpyrifos until 2029-2030. Chinese company *Shaanxi Hengtian Biological Agriculture Co., Ltd.,* for example, obtain the official certificate of registration for *Валсарел* (contains chlorpyrifos, 480 g/l and cypermethrin, 50 g/l) [Greenwomen couldn't find the name of this product in English] manufactured by Stockton Chemical, USA; the expiration date for this certificate is January 10, 2029. Another example is the company *Dow AgroScience LLC,* which obtained the certificate of registration for *Dursban* (contains chlorpyrifos, 480 g/l); the expiration date for this certificate is March 16, 2030.[11]

Studies of pesticide residues in tomatoes and cucumbers from Kazakhstan and the associated health risk were implemented in 2012-2014 in Kazakhstan by scientists from Laboratory of Pesticide Residues, Plant Protection Institute - National Research Institute, Poland (Bozena Lozowicka & Piotr Kaczynski), Kazakh National Agrarian University (Elmira Abzeitova), Kazakh Research Institute for Plant Protection and Quarantine (Abai Sagitov & Kazbek Toleubayev), and Kostanay State University (Alina Li).

In this study, 82 sampled vegetables of greenhouse origin were collected in 2012–2014 (April, November and December) (44 tomato and 38 cucumber samples) in Almaty. In studies, the researchers investigated over 180 active substances: insecticides, fungicides, herbicides and acaricides. Analyses were carried out in a Polish scientific laboratory.[12]

The concentration of all detected pesticide residues found in 48 samples (58.5 %) was compared with the maximum residue levels set by the European Commission (EC 2005) EU-MRLs and Custom Union (Russia, Belorussia and Kazakhstan) (CU 2010).

The residue levels of chlorpyrifos were found in every fourth sample, in concentrations exceeding MRL. The residue levels of insecticides in samples were found more often.

[11] According to the official reply that Greenwomen received from the State Inspection Committee for Agro-Industrial Complex of the Ministry of Agriculture of the Republic of Kazakhstan on June 24, 2022.

[12] Lozowicka, B., Abzeitova, E., Sagitov, A. *et al.* Studies of pesticide residues in tomatoes and cucumbers from Kazakhstan and the associated health risks. *Environ Monit Assess* **187,** 609 (2015). https://doi.org/10.1007/s10661-015-4818-6 (access date 02.07.2022)

"Organophosphorus insecticides (OPIs) were detected in seven samples. Among these insecticides, four samples displayed chlorpyrifos ethyl concentrations above the CU-MRL (one cucumber sample, 0.07 mg kg⁻¹, and three tomato samples, 0.01 mg kg⁻¹).

Chlorpyrifos ethyl has a broad-spectrum activity. Poisoning with this compound can affect the central nervous system, cardiovascular system and respiratory system (Nolan et al. 1984)," writes the authors of the report.[13]

Another study that was carried out in 2015-2018 by the Laboratory of Toxicology of Pesticides of Kazakh Research Institute for Plant Protection and Quarantine named after Zh. Zhiembaev proved the fact that chlorpyrifos is still actively used in agriculture. The researchers analyzed the samples of vegetables and fruits obtained from the farmer's markets in Almaty.

Gulnisam Rvaidarova, PhD in Biology, in her interview to mass media, reported that the results of study showed that the level of chlorpyrifos in young potatoes, lettuce and carrots is significantly exceed MRL. The residue levels of chlorpyrifos have also been found in cucumbers and tomatoes.

Kazakhstan, so far, intends to use the products containing chlorpyrifos for disinfection, disinfestation, and deratization. The authorities declare that the products *'included in the register of products permitted for use on the territory of the Republic of Kazakhstan'* are used for these purposes.

Online stores in Kazakhstan also sell the products containing chlorpyrifos, despite the fact that this product is *'a potent neurotoxin that research shows can permanently and irreversibly harm the developing brains of children. Exposure in early life to chlorpyrifos…can increase risk of developmental delays, learning disabilities, lower IQ scores, and ADHD. It can also lead to respiratory problems and diminished lung function'*, as NRDC (Natural Resources Defense Council) informs.[14]

Environmental NGOs should raise awareness about informing the population about the dangers of chlorpyrifos and urging authorities to ban it.

[13] Lozowicka, B., Abzeitova, E., Sagitov, A. *et al.* Studies of pesticide residues in tomatoes and cucumbers from Kazakhstan and the associated health risks. *Environ Monit Assess* **187,** 609 (2015). https://doi.org/10.1007/s10661-015-4818-6 (access date 02.07.2022)

[14] The Chlorpyrifos Ban Is a Win for Science—and Children [Electronic source] // NRDC. Official website. URL: https://on.nrdc.org/3I9eYyA (access date 02.07.2022).

This report prepared by *Greenwomen*, Analytical Environmental Agency, Kazakhstan.

International documents and agreements, online reviews, media publications, information provided by NGOs, the IPEN (International Pollutants Elimination Network) members, information provided by Eco-Accord, the IPEN focal point in the EECCA region (Eastern Europe, the Caucasus and Central Asia) and information obtained by Greenwomen itself used for preparation of this report.

Please check the following link to learn more about activity of IPEN Focal Point in EECCA: www.ecoaccord.org www.ipen.org

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