ECHA public consultation - Draft proposal for listing chlorpyrifos in Annex A to the Stockholm Convention on Persistent Organic Pollutants

8th December 2020

The Health and Environment Alliance (HEAL) supports the EU's proposal to list chlorpyrifos as a Persistent Organic Pollutant (POP) under the Stockholm Convention.

Chlorpyrifos is a dangerous legacy pesticide, with clear human and ecosystem toxicity, which has now become a global contaminant.

Background information

- Chlorpyrifos is **legacy pesticide** subject to increasingly strict regulation. Chlorpyrifos was banned as a pesticide active substance at the EU level in December 2019 and can no longer be used since January 2020 (1). In the US, the substance has been restricted from household applications twenty years ago (2), and States are increasingly banning it fully (for instance Hawaii, California) (3).

- Chlorpyrifos is **among the most toxic** remaining examples of the organophosphate class of pesticides, which act by disrupting the metabolism of a critical neurotransmitter — acetylcholine — a pathway essential both in insect pests and in humans. (The nerve agents Sarin and VX are both members of the organophosphate family). The toxic mechanism of the organophosphates is so potent that in 2018 a group of globally recognized scientists have called for **a ban on the entire class of compounds** (4).

- **Demand for chlorpyrifos is dropping rapidly**, indicating that companies are able to phase out this toxic substance. In early 2020, Corteva's announcement that it would stop producing chlorpyrifos was presented by the company as a "strategic business decision" based on the reduced demand (5). In fact, demand for chlorpyrifos has fallen by 80% in the past 25 years (3).

Rationale for supporting the nomination of Chlorpyrifos as a POP under the Stockholm Convention

Chlorpyrifos easily meets the criteria for inclusion in the Stockholm Convention.

Toxicity. The toxicity of chlorpyrifos is uncontested.

Chlorpyrifos is classified by the EU as both Aquatic Acute Toxity 1 ("very toxic to aquatic life") and Aquatic Chronic Toxicity 1 ("very toxic to aquatic life with long-lasting effects". Additionally, the EU's support dossier rightly highlights that although chronic toxicity studies "usually expose animals to sub-lethal concentrations", in the case of chlorpyrifos, "because of its high toxicity,

lethality often remains the most sensitive endpoint recorded in chronic tests, despite the low concentrations" (6, p25). Chlorpyrifos is highly toxic to many non-target species, notably including the honey bee (6, p27).

The acute human health effects of chlorpyrifos are well known and consistent with other organophosphates. More subtly, the epidemiological and animal toxicology data demonstrate strongly and consistently that chlorpyrifos causes developmental neurotoxicity, including tremor, decreased IQ, and other cognitive deficits after prenatal exposure at quite low concentrations. In fact, the recent EU decision not to renew Chlorpyrifos approval is based on scientific evidence supporting concerns for developmental neurotoxicity as well as possible genotoxicity. According to the European Food Safety Agency, it is impossible to determine safe levels of exposure based on available data (7).

Bioaccumulation.

Attempts to measure the bioaccumulation of chlorpyrifos result in values ranging well into the thousands: 5700 in duckweed; 3600 in the axolotl; and 14000 in the mosquito. In fish, BCF values range up to 5000-7000. Given these high values, and despite the large uncertainties, it would be misguided to conclude the chlorpyrifos had a BCF lower than that in the Stockholm Convention guideline (which is of 5000). Additionally, the Convention text sets a log(Kow) cutoff of 5 when bioaccumulation data is not available; in this case, the reported range of log(Kow) is 4.7 to 5.2. If these data are not sufficient alone to prove that chlorpyrifos has BCF>5000 and log(Kow)>5, they certainly cannot be used to argue that chlorpyrifos falls below these thresholds either.

Persistence.

As with bioaccumulation, measured values for the persistence of chlorpyrifos are highly variable. The most consistent studies indicate a half-life around 70 days. This is below the Convention's threshold for persistence (which is of 180 days) but only by about a factor of two. Other reported half-lives range from tens of days to 140+ days. In our view, this data is far from sufficient to argue that chlorpyrifos falls below the Stockholm Convention's threshold.

The hydrolysis of chlorpyrifos is dependent on both pH and temperature. Given that virtually all studies are done in the standard range of 25-30 degrees Celsius, half-lives are expected to be significantly higher in Northern and Arctic waters and soils.

Further, we note that many hydrolysis studies appear likely to overestimate degradation rates — and underestimate half-life — since volatilization, although low, accounts for a significant amount of chlorpyrifos loss (6, p5).

Importantly, chlorpyrifos's very high Koc indicates that it will primarily be adsorbed to sediments, rather than dissolved in the water column. Since the substance degrades more slowly in soil than in water, half-lives significantly longer than the those measured in water are far more realistic.

Finally, we note that the half-life of chlorpyrifos increases at higher concentrations / application rates (6, p7). While the general agricultural use of chlorpyrifos has declined, it is still used in some specific situations — e.g., for the control of termites in India. These uses require much higher concentrations, up to 100 times that of typical agricultural use, and they are thus likely to lead to still longer half-lives.

The global presence of chlorpyrifos provides additional strong evidence for its persistence. As with many other POPs, chlorpyrifos is found globally, often far from any sources of emission: in fish; in runoff after rainfall; in freshwater and groundwater; and even in sediment cores in Arctic lakes. The global distribution of chlorpyrifos speaks to its persistence and to the necessity of new controls.

In conclusion, building upon the supporting dossier and the arguments outlined above, we support Chlorpyrifos' nomination as a POP under the Stockholm Convention due to its identification as a persistent, bioaccumulative, and toxic compound as well as the well-documented global reach of its pollution. We hope that this listing will spur innovation and the development of better and safer alternatives worldwide.

References

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