PESTICIDES

EU should ban brain-harming chlorpyrifos to protect health

FACTSHEET

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Chlorpyrifos, a developmental neurotoxic pesticide[i], is one of the most commonly used insecticides in Europe. Yet increasing evidence links it with serious health conditions including disruption of the hormonal system and impacts on children's brain development.

Chlorpyrifos residues are commonly found in our fruits, vegetables[ii], cereals and dairy products as well as our drinking water. Its current authorisation is set to expire on 31 January 2019[iii]. Should the European Food Safety Agency (EFSA) give a positive opinion and the European Commission make a proposal on that basis European Member States may decide to renew the substance[iv].

There is a solid body of scientific evidence of chlorpyrifos' adverse effects on human health, and the current reauthorisation procedure provides the European Commission and Member States with the opportunity to get this harmful chemical off the shelves once and for all. This is critical in order to protect the farmers who are directly exposed to the substance, their families, residents of agricultural areas, consumers and ultimately the most vulnerable, children, infants and babies in the womb, whose brains are still developing and are most vulnerable to the toxicity of chlorpyrifos. The broader population is at additional risk given we are all exposed to a cocktail of chemicals on a daily basis.

This factsheet sets out the case and evidence against the use of chlorpyrifos and explains the health impacts which justify its ban.

WHAT IS CHLORPYRIFOS?

Chlorpyrifos is a typical broad-spectrum, chlorinated organophosphorus insecticide, which kills insects upon contact by affecting the functioning of the nervous system[v]. Organophosphorus pesticides (OPs), including insecticides such as chlorpyrifos operate by blocking the functioning of an enzyme (acetylcholinesterase) that breaks down a specific neurotransmitter, (called acetylcholine). Acetylcholine is responsible for passing impulses from one nerve cell to the other throughout the nervous system[vi]. The accumulation of acetylcholine in the neuron junctions (synapses) of the insects causes increased transmission of nerve impulses and an overstimulation of the nerve cells, which leads to neural toxicity and eventually death.

WHAT ARE THE EFFECTS OF CHLORPYRIFOS ON OUR HEALTH?

Short and long-term health conditions related to exposure to pesticides are of utmost relevance for the farmers directly using them, their families, as well as the communities surrounding areas where the substances are being used. However, the large indirect exposure of the population - from the workers exposed to chlorpyrifos, to the consumers buying and eating products contaminated by pesticides, or the individuals exposed through the water cycle - calls for precaution and a health-first approach when considering the placing of pesticides on the market.

Chlorpyrifos' health impacts:

- **Decreased IQ**
- **Loss of working memory**
- **Attention deficits, like ADHD**
- **Autism**
- **Thyroid hormone disruption**
- **Reproductive problems**
- **Metabolic disturbances**
- **Nerve damage**
- **Parkinson's disease**

Moreover, since the target enzyme of organophosphates is found not just in insects but in most animals, organophosphate pesticides can be neurotoxic to several

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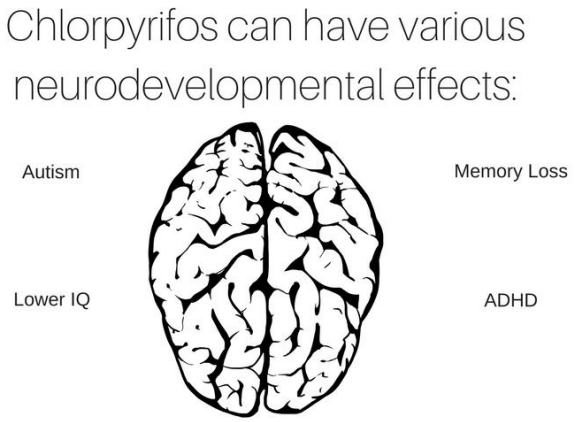
animal species, including humans. Several such pesticides have been progressively banned following evidence on their potential to cause neurotoxicity in humans. In the case of chlorpyrifos, the evidence of severe health conditions, in particular when it comes to children's brain development, suggests that it should not have been authorised in 2006 in the first place.

ENDOCRINE-RELATED EFFECTS ON THE DEVELOPMENT OF THE HUMAN BRAIN

There is a significant body of scientific evidence illustrating the endocrine disrupting characteristics of chlorpyrifos [vii]. Endocrine disrupting chemicals - also known as hormone disruptors or EDCs - interfere with the function of the natural hormones in our bodies, which are our chemical messengers. Endocrine disruption is of alarming concern, because it can alter essential functions, such as reproduction, brain functioning, or immune response. Chlorpyrifos particularly affects the nervous system, in part because its target enzyme acetylcholinesterase is present in the brain of most animals[viii], and partly due to other modes of action[ix].



Children are especially vulnerable for these effects since their brain is still developing[x]. A number of studies show that children exposed to chlorpyrifos while in the womb or in early life can suffer neurodevelopmental effects at a later stage [xi] - by causing structural changes in the developing brain and possibly resulting in a decrease of cognitive functions, such as IQ and working memory loss[xii].

Other effects linked to chlorpyrifos exposure include an increased risk of developing attention deficits such as attention deficit hyperactivity disorder (ADHD)[xiii] as well as an increased risk of developing autism spectrum disorders[xiv].

According to animal studies, **prenatal and postnatal exposure may influence the thyroid function by disrupting thyroid homeostasis.** A mother's exposure to chlorpyrifos may influence the *in utero* environment of the foetus and affect the functioning of the thyroid later in life[xv,xvi]. The thyroid hormone is essential for normal brain development and function during the early-life stage- a period that is often overlooked in the safety testing of pesticides.

OTHER HEALTH IMPACTS

Other research findings about exposure to chlorpyrifos reveal adverse effects on women's reproductive systems [xvii , xviii], and an increased risk for metabolic disturbances such as overweight or obesity in relation to early-life exposure to chlorpyrifos[xix].

Increased saliva, urination, defecation, and vomiting have been reported as immediate health side effects for adults who have been exposed to chlorpyrifos. Workers who were exposed to higher levels of chlorpyrifos, furthermore, have reported memory problems, fatigue, and loss of muscle strength [xx]. There have also been indications that exposure to chlorpyrifos is linked to an increased risk of Parkinson's disease[xxi].

The negative health effects of chlorpyrifos could be amplified in combination with exposure to other pesticides. Organophosphate pesticides can have cumulative effects since they block the same enzyme. Several OPs, such as chlorpyrifos, dimethoate, ethoprophos or phosmet, are currently authorised for use on the EU market despite their high toxicity, which raises severe concerns about the long-term health effects of the cocktail we are exposed to[xxii] - especially since pesticide risk assessment is carried out substance by substance, instead of taking into account our real-life exposure to a mixture of substances.

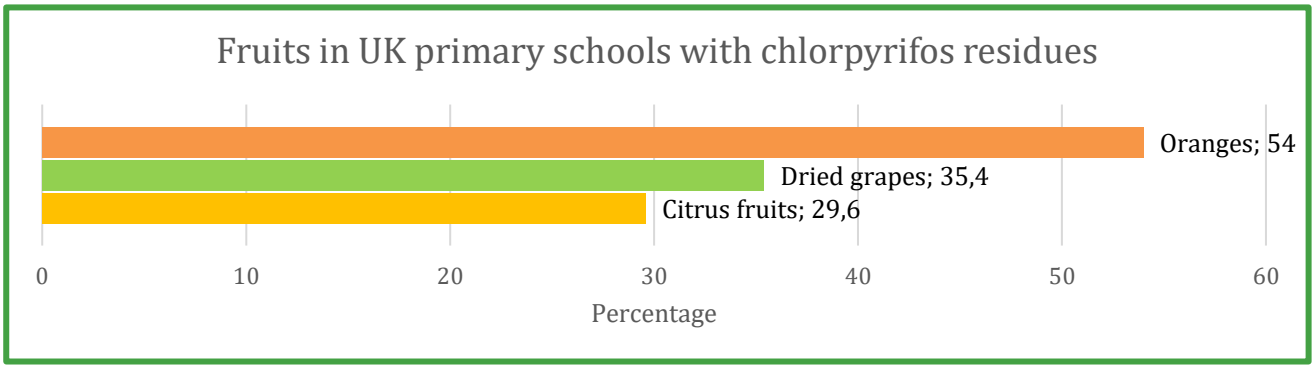


Figure 1: Data from PAN UK "Food for Thought. Pesticides residues in the School Fruit and Vegetable Scheme (SFVS)" September 2017.

Where is chlorpyrifos found?

- **Chlorpyrifos and its metabolites have been found in urine, maternal and cord blood, breast milk, cervical fluid, sperm and children's hair[xxiii].**
- **2015 data indicated that chlorpyrifos is one of the five the most detected pesticides in the fruits and vegetables sampled across Europe (followed by the fungicides pyrimethanil and tebuconazole [xxiv]).2015 data demonstrated chlorpyrifos residues at higher levels than the toxicological reference value (ARfD) in bananas, table grapes, peppers[xxv].**
- **According to EFSA's monitoring of pesticides residues levels, in 2016 there were increased exceedances regarding residues of chlorpyrifos compared to 2013 for the same commodities, with 59 exceedances reported out of 10,212 samples analysed for this pesticide[xxvi].**
- **A 2017 report shows chlorpyrifos was found in 20% of tested fruit samples in UK schools, despite having almost no authorised uses in the UK[xxvii]. It was mostly found in raisins (78%) and soft citrus (42%).**
- **An earlier testing carried out in the UK in 2011 found chlorpyrifos in 54% of the samples of oranges, 35.4% of those of dried grapes, and 29.6% of those of citrus fruits[xxviii].**
- **Chlorpyrifos was found in 8 out of 10 samples from water basins in Spain in 2016[xxix].**

CHLORPYRIFOS AND WHERE IT IS FOUND

According to the most recent data available on pesticides residues at the European level, chlorpyrifos is one of the five most regularly found insecticides in food products produced in the EU - in particular in fruits, rice, cereal products, fish, dairy products, and drinking water. Chlorpyrifos is being used on grain during storage, or directly in the fields by spraying on the crops from cotton to fruits, vegetables, or wine. In 2015, the European Food Safety Authority (EFSA) found that chlorpyrifos was among the pesticides that most frequently exceeded the acute health standard [xxx] . Since then, the MRL for chlorpyrifos was lowered in several food items because of increased health concerns[xxxi].

Chlorpyrifos' regular use can maximise its persistent and bioaccumulative properties in the environment (soil, water, food, air), which is critical since it is directly released into the environment when used as an insecticide. It can travel long distances, to the point that it has even been found in the Arctic[xxxii], and also finds its way into the human body, through environmental exposure or consumption of contaminated food. Consequently, the use of chlorpyrifos results potentially in long term exposure.

Besides ingestion through food and water, exposure to chlorpyrifos can also happen through inhalation. Farmers are at particularly high occupational risk, when they handle the pesticide, spray it on their crops, and clean their equipment. Farmers' families and surrounding communities have an increased risk of breathing in air that contains spray drift, with particular health concerns for young kids, pregnant women and their developing babies. Rain can also wash chlorpyrifos off the surface, thereby contaminating local and downstream drinking water sources.

LEGISLATIVE STATE OF PLAY

EUROPEAN UNION - At the time of writing, chlorpyrifos is authorised in 20 European member states (see box on the right). In the case of UK, the government implemented severe restrictions on the use of chlorpyrifos in April 2016 due to new human health safety levels. Risk assessments found that almost all uses of chlorpyrifos exceeded the new permitted levels of exposure, hence the UK withdrew these uses from the market[xxxiii].

At the EU level, Spain is the Rapporteur Member State in the current re-approval process of chlorpyrifos. The applicant is an industry task force comprised of Dow Agrochemicals and Adama Agriculture among others. .

Chlorpyrifos' authorisation on the EU market was due to expire on 31 January 2018 but the expiration date was extended to 31 January 2019. Due to the lack of transparency around the European approval process for pesticides, at the moment of writing it is however impossible to assess how long the process will actually last. In response to EFSA's public consultation on the rapporteur assessment report (RAR) of chlorpyrifos, PAN International, PAN Europe, and HEAL together with PAN Germany submitted comments because the overwhelming scientific evidence on serious health concerns related to chlorpyrifos was insufficiently taken into account in the RAR[xxxiv].

EU countries where chlorpyrifos is authorised:

- **Austria**
- **Belgium**
- **Bulgaria**
- **Cyprus**
- **Czech Republic**
- **Estonia**
- **Greece**
- **Spain**
- **France**
- **Croatia**
- **Hungary**
- **Italy**
- **Luxembourg**
- **Malta**
- **The Netherlands**
- **Poland**
- **Portugal**
- **Romania**
- **Slovakia**
- **United Kingdom**

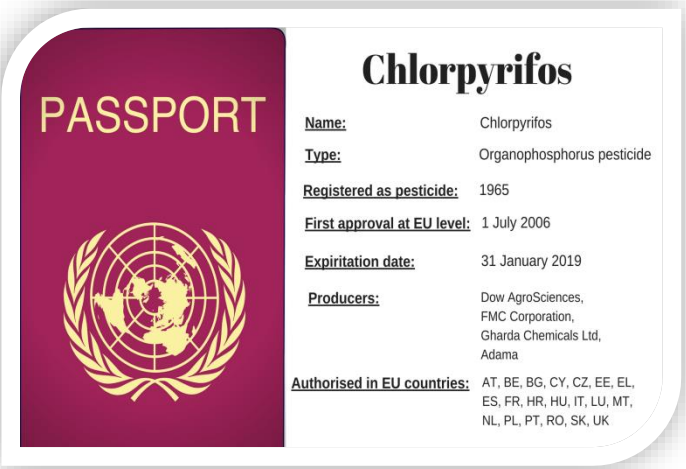
EU countries where chlorpyrifos is <u>not</u> authorised:

- **Denmark**
- **Finland**
- **Germany**
- **Ireland**
- **Latvia**
- **Lithuania**
- **Slovenia**
- **Sweden**

UNITED STATES OF AMERICA - Chlorpyrifos has been banned for indoor home use since 2001[xxxv]. The process to ban chlorpyrifos for agricultural use started in 2015[xxxvi], but was halted in May 2017 following a change of administration following the election of President Donald Trump[xxxvii]. This backtracking has been met with significant opposition, including because it is going against the conclusion of the Environmental Protection Agency's (EPA) own scientists who found the chemical to be potentially causing significant health consequences[xxxviii,xxxix]. In June 2018, the state of Hawaii was the first state to ban the use of chlorpyrifos, overriding the decision made on federal level[xl].

RECOMMENDATIONS

- **To the European Commission**: In line with the scientific evidence and the precautionary principle, to not propose any renewal of chlorpyrifos and to no grant any further extension to chlorpyrifos.
- **To EU Member States**: To vote in favour of not renewing the approval of chlorpyrifos on the EU market; to not grant any extended grace period for the sales of products containing chlorpyrifos; closely monitor the health of populations who have been exposed to chlorpyrifos so far (for example through the Europe-wide human biomonitoring project HBM4EU).
- **To the European Commission, European Parliament and EU Member States**: To subsequently set the maximum residue levels at the lowest limit of analytical determination without any derogation for imported goods, as should automatically happen when a substance is banned. Foresee sufficient controls enabling effective application of the new level.
- **To the European Commission, Member States and industry:** To adopt necessary measures to remove the accumulated presence of chlorpyrifos and its metabolites in the ecosystems. A first step would be for chlorpyrifos producers to be charged for the costs of water decontamination. Measures to avoid further contamination should also be taken.
- **To the European Commission:** To finally deliver its legal obligation to present a non-toxic environment strategy, which should include a commitment to phasing out toxic pesticides such as chlorpyrifos, increase the use of the existing safe alternatives and review the current risk assessment system.
- **To public health, medical and patient community:** To raise awareness on the harm from OPs and other pesticides and advocate for restrictions in public places such as hospitals, clinics, schools, public gardens, parks etc.



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About the Health and Environment Alliance (HEAL):
The Health and Environment Alliance (HEAL) is the leading not-for-profit organisation addressing how the environment affects human health in the European Union (EU) and beyond. HEAL works to shape laws and policies that promote planetary and human health and protect those most affected by pollution, and raise awareness on the benefits of environmental action for health.

HEAL's over 70 member organisations include international, European, national and local groups of health professionals, not-for-profit health insurers, patients, citizens, women, youth, and environmental experts representing over 200 million people across the 53 countries of the WHO European Region.

As an alliance, HEAL brings independent and expert evidence from the health community to EU and global decision-making processes to inspire disease prevention and to promote a toxic-free, low-carbon, fair and healthy future.

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