

# Chlorpyrifos: The Most Dangerous Pesticide You've Never Heard of

By [Staffan Dahllöf](#)

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*Scientists say there is no acceptable dose to avoid brain damage. Its use is banned in several European countries. Yet its residues are found in fruit baskets, on dinner plates, and in human urine samples from all over Europe. Now producers are pushing for a renewed EU approval – perhaps in vain.*

The name is chlorpyrifos. Here is why the chemical and its risks are almost unknown to the public.

Chlorpyrifos kills insects on growing vegetables and fruit.

**Thomas Backhaus**, professor for ecotoxicology and environmental science at the University of Gothenburg, says that the substance took a long time to be recognised as one of the “nasty” ones.

Image on the right: Philippe Grandjean, professor in environmental medicine at the University of Southern Denmark and Harvard School of Public Health in the US, notes that brain damage connected to chlorpyrifos have been found at the lowest detectable dose (Photo: Marcos Garcia Rey)



“In comparison with [glyphosate, the active substance in Roundup](#), chlorpyrifos has been flying under the radar. When we talk of herbicides like glyphosate that kill weed humans can cope because we don’t have chlorophyll and don’t get directly affected. When we talk about insecticides, you have the problem that they affect all developing animals, including humans,” he says.

Backhaus’ concerns are well known in academic circles and shared by other researchers.

**Philippe Grandjean**, professor in environmental medicine at the University of Southern Denmark and Harvard School of Public Health in the US, notes that brain damage connected to chlorpyrifos have been found at the lowest detectable dose.

“That means by definition that you can’t define a dose tolerable for consumption – that dose must be zero,” he says.

The poisonous effect of chlorpyrifos on insects is not disputed.

The unresolved question is to what extent the usage of chlorpyrifos is dangerous to all living organisms like fish in nearby waters or farm workers in the fields, or to anybody eating the treated products.

### The spread



Tests of food samples in all EU countries in 2016 show chlorpyrifos and chlorpyrifos-methyl in 5.5 percent of the 76,200 samples, as recorded by EU institution [EFSA \(European Food Safety Agency\)](#).

If we look only at randomly-sampled unprocessed plant based food products in EU, the percentage is 6.2 according to [Pesticide Action Network Europe](#).

In the samples recorded by the EFSA, 847 contained chlorpyrifos or chlorpyrifos-methyl above the Maximum Residue Limit (MRL).

However environmental scientists believe residue levels for chlorpyrifos should be zero.

In countries where the use of chlorpyrifos is banned the pesticide nevertheless reaches consumers through the free movement of goods in the internal market.

In 2013, [Swedish researchers reported findings](#) of chlorpyrifos and other pesticides in urine from middle-aged women, a group with a high intake of fruits and vegetables.

Chlorpyrifos has never been registered for agricultural use in Sweden.

In 2016, [studies for the Danish ministry of environment](#) found chlorpyrifos in the urine from nine out of ten children and their mothers.

The researchers suggested a possible connection between chlorpyrifos and development of ADHD (Attention Deficit Hyperactivity Disorder).

In Wallonia, the French-speaking part of Belgium, the Public Service Scientific Institute in 2018 [found residues](#) of chlorpyrifos in 100 percent of urine samples from 258 schoolchildren aged 9-12.

A [recent study in California](#) connect autism and early brain damage in children with prenatal and infant exposure of chlorpyrifos.

A child's risk of brain damage increases if its mother had been exposed to the pesticide by living nearby sprayed fields, the study found.

The Californian study published in March 2019 has triggered a ban of chlorpyrifos in the US's largest agricultural state. Five other US states; Hawaii, Oregon, New York, Connecticut and New Jersey have announced or decided similar bans.

On a federal level a ban on chlorpyrifos has been blocked by the Trump administration since 2017.

In April 2019, a [court ordered the US Environmental Protection Agency](#) to decide by mid-July if it will permanently ban the chemical.

### **The European confusion**

In Europe the scientific debate over chlorpyrifos is hardly known outside expert circles and the decision process about allowing or banning pesticides is difficult to track and to follow.

EU countries follow common decisions on whether to approve a substance like chlorpyrifos or not.

Chlorpyrifos has been approved on an EU-level since 2006 while decisions to allow products with the active substance, and the use of them, are up to the member states.

Eight member states have banned, or never authorised the use of chlorpyrifos products: Denmark, Finland, Germany, Ireland, Latvia, Lithuania, Slovenia and Sweden.

The United Kingdom banned the use of chlorpyrifos, with one exception, in 2016. Chlorpyrifos is not authorised in Norway, nor in Iceland. The Swiss government decided to withdraw permissions for 12 chlorpyrifos and chlorpyrifos-methyl products 12 June, according to newspaper Tagblatt.

As goods within the EU are supposed to move freely across national borders, treated food thus gets spread around. That's why consumers might find vegetables and fruit treated with chlorpyrifos in their grocery stores even if such treatment has never been allowed in the country.

A pan-European alert system has been set up for national authorities to notify other authorities on findings of hazardous food. These alerts often come after suspicious products have been sold - and consumed.

### **How companies have a say**

Evaluation of possible health and environmental hazards are primarily based on studies paid for by the producers.

In the case of chlorpyrifos the main producer has been Dow Chemicals, now Corteva Agriscience, the agricultural division of DowDuPont. Corteva Agriscience turned into a standalone company on 1 June 2019.

“The producers’ role is obvious and well known to the scientific community. The present EU assessment of chlorpyrifos is to a large extent based on hundreds of studies financed and submitted by Dow,” says **Axel Mie**, associate professor at the Karolinska Institute, Department of Clinical Science and Education, Stockholm.

With colleagues Christina Ruden and Philippe Grandjean, Mie has initiated a scientific debate.

The three environmental scientists claim that data from Dow Chemicals’ own research back in 2000 actually showed that chlorpyrifos has an impact of the development of cerebellum (‘little brain’) in rats. [These findings](#) had however not been recorded in the conclusions filed to the EU authorities.

The scientists behind the criticised studies reject these claims. [They argue](#) the loss of brain weight in rats can be explained by the brains’ fixation in formaldehyde before being measured, and that no pesticide control product has been more thoroughly evaluated.

In the debate published by scientific journal Environmental Health, where Grandjean is one of the editors-in-chief, the defenders of chlorpyrifos first stated they had no competing interests.

In a [correction posted in May 2019](#), they declared that at the time of their submission to the journal, they were employed by Dow Chemicals, the primary registrant and manufacturer of chlorpyrifos.

### **Corteva Agriscience responds**

We have asked Corteva Agriscience for comments on the allegations above specified in the following questions:

1. Is the description of the debate in Environmental Health accurate?
2. Was the hiding of the employment status of the scientists an intentional omission? Could it have been handled differently to minimise perceptions of impropriety?
3. How does Corteva see challenges with the current system where companies finance research that the US, EU and others base decision on?
4. Does Corteva have any other comments about criticism from environmental scientists and NGOs opposing its products, or comments you want to make on the benefits of protecting all kinds of crops.

From its headquarters in Johnston, Illinois, US, Corteva Agriscience chose to answer with two statements in writing:

“Chlorpyrifos is one of the most widely studied crop protection products in the world and is currently registered in roughly 100 countries, including the US, all major US trading partners and in the EU. Policy should be driven by sound science and data and follow a predictable and transparent regulatory review process.

“Labelled uses of chlorpyrifos rest on five decades of experience in use, health

surveillance of manufacturing workers and applicators, and more than 4,000 studies and reports examining the product in terms of health, safety and the environment.”

### **Not for us to know**

The present EU approval of chlorpyrifos expires on 31 January 2020. This could indicate the story of chlorpyrifos is coming to an end.

Yet that is not necessarily the case.

Market analysts project that the sale of chlorpyrifos will see significant growth in the next five years, according to [Persistence Market Research](#) which will release a new report in August.

Experts from EU member countries Spain and Poland have since May 2017 prepared a reassessment of chlorpyrifos and related chlorpyrifos-methyl for a possible new acceptance in the autumn, before the present approval ends.

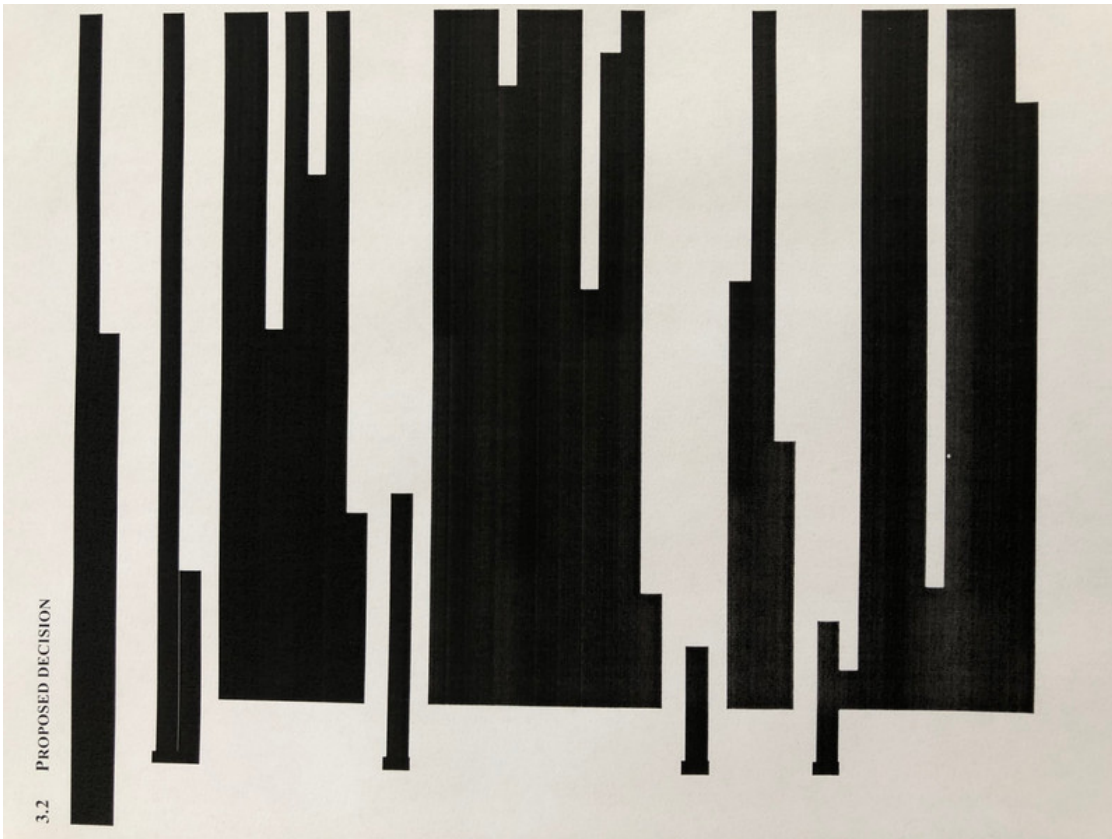
There are five companies producing chlorpyrifos registered in Spain including Dow, now Corteva.

One of the five is FMC Corporation which until 2016 manufactured chlorpyrifos at its plant Cheminova in Denmark where chlorpyrifos is not allowed to use.

The bulk of a draft reassessment report has been open for comments. It consists of some thousand pages filling close to 90 megabits of data when downloaded from the homepage of [EFSA \(European Food Safety Agency\)](#).

Not all of it is readable though. The proposed decision by Spain and Poland is not accessible, as it has been redacted.

This redaction of central information is done by EFSA which has the job of preparing the forthcoming EU decision.



The redacted document

But is EFSA legally justified in keeping this information under wraps? The [Aarhus convention](#), a pan-European UN-convention from 1998, has been binding EU-law since 2003.

This law says information related to emissions to the environment must not be withheld on the ground of protecting commercial interests.

This was underlined by the EU court in Luxembourg in March 2019. The court said information concerning the herbicide glyphosate, known under the product name Roundup, could not be held back by EFSA.

### **The anonymous lawmakers**

On top of the known spread, the scientists' warnings, the producers' role, and the restricted public information there is one more aspect of chlorpyrifos to be decided; what the EU will decide - either to ban, or to approve, the future for the disputed pesticide.

Followers of EU politics will know the two legislative institutions are the EU Council, representing the member states, and the European Parliament representing the peoples of Europe. This does not apply for approval of pesticides.

Here the final decision will be taken by a committee of national experts on the suggestion of the European Commission, a non-elected body of civil servants.

Lithuanian Vytenis Andriukaitis is commissioner for health and food safety. Below him is the commission's Directorate-General for Health and Food Safety headed by Anne Bucher, and below her the directorate for health and food audits and analysis, and so on.

The actual evaluation of chlorpyrifos will be done by the unit for pesticides and biocides, at

the sixth level from the top in the hierarchy.

“But, other directorate-general will also be consulted before the final decision, ” says an EU commission spokesperson.

This committee can reject the commission’s proposal if its members can form the necessary majority. Should that happen the commissions can turn to an appeal committee for a re-assessment.

At the time of writing it is known when meetings are scheduled for the relevant committee. The agenda for these meetings is not.

We are not supposed to know who the participants in these meetings are. What suggestion they will be asked to consider is still unknown.

Nevertheless, a commission source indicates that “The commission won’t go forward with the renewal of the authorisation because the health concerns are very clear”.

The NGO Pan Europe told us: “We’ve heard in the corridor that chlorpyrifos doesn’t meet the approval criteria”.

### **EU system alerts consumers - after they have eaten**

Documents released to us indicate that the EU-wide reporting system called [RASFF \(Rapid Alert System for Food and Feed\)](#) gives European consumers a weak protection, if any.

In April 2018, Austria notified 19 other countries of imported basmati rice from Pakistan that contained chlorpyrifos in a level deemed to pose a serious risk to human health.

The rice was withdrawn from the market by importers in Austria, Germany and the Netherlands.

In Switzerland, Sweden, Czech Republic, Slovakia, Hungary and parts of Italy, the rice was nevertheless reported sold - and most likely consumed - in spite of the alerts in the RASFF system. This was shown in a detailed RASFF report, not detectable in the public RASFF portal run by the European Commission.

Civil servants working with RASFF say the system is aimed to inform other EU-states of potential risks but not designed to detect shortcomings of control. The responsibility for safe products always lays with importers and resellers, we are told.

They also point out that alerts go to the national food safety authorities, while the work in the field like inspections often is done at the municipal level. This creates yet another time lag between alerts and consequences.

**Ingunn Haarstad Gudmundsdottir**, senior adviser at the Norwegian Food Agency, Mattilsynet, notes:

“When fresh fruit, berries and vegetables are tested randomly the batches are often already sold and consumed when we get the results from the laboratory analysis.”

This observation is echoed by Philippe Grandjean professor in environmental medicine:

“The sad thing about the Danish Food Authority’s control is that the food is eaten at the time the analysis is made, and if the three percent [of chlorpyrifos findings in food samples] in Denmark is representative, then it must mean that there is thus three percent of our products which are in fact unsuitable for human consumption, ” he says.

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*Featured image: Spanish vegetable growing in El Ejido, Almeria province. Chlorpyrifos has been approved on an EU level since 2006 - but eight states have banned, or never authorised, its use: Denmark, Finland, Germany, Ireland, Latvia, Lithuania, Slovenia and Sweden (Photo: Marcos Garcia Rey)*

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