

Residents exposed to pesticides: the flaws in risk assessments

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Association between Residential Proximity to Viticultural Areas and Childhood Acute Leukemia Risk in Mainland France: GEOCAP Case-Control Study, 2006–2013

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Environmental Health Perspectives

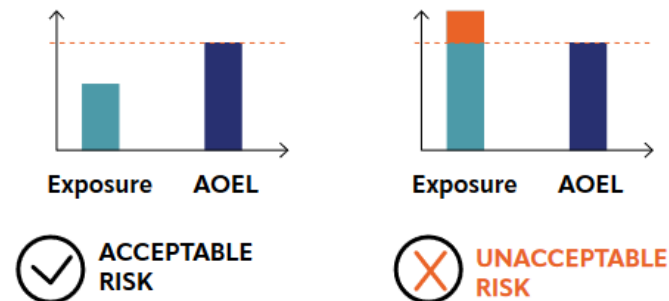
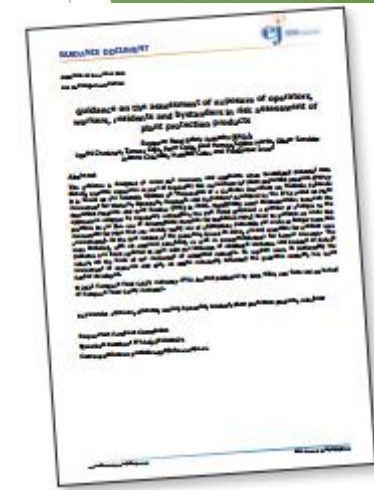
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- ▶ the scientists observed an association between the risk of developing ‘lymphoblastic’ leukaemia and the extent of the area covered by vines, within the 1,000-metre perimeter around the children's address. This risk increased moderately with the area covered by vines: on average, for every 10% increase in the area covered by vines within the 1,000-metre perimeter, the risk of lymphoblastic leukaemia increased by almost 10%.
- ▶ Why such results as the risk of an exposure to pesticides for bystanders is supposed to be properly evaluated ?

What is a risk assessment ?

- ▶ 1/ Estimation by calculation of the exposure of local residents (in mg of active substance/kg of body weight) Method described in a guide published by EFSA in 2014, updated in 2022. Used to calculate the maximum level of exposure expected under normal conditions of product use = ‘worst case’ situation.
- ▶ 2/ Derivation of health no-effect value (AOEL, mg a.s/kg bw) (AOEL = Acceptable Operator Exposure Level)
- ▶ 3/ Risk assessment = comparison of estimated exposure with the health no-effect value.



This method is carried out for each substance taken separately.

Flaws in exposure assessment

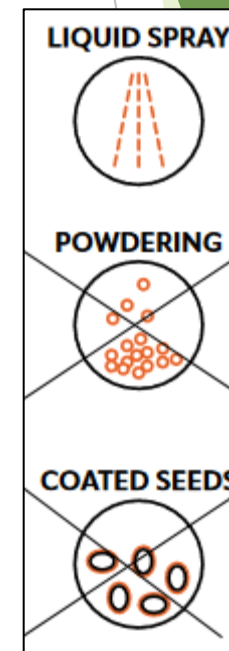
- a** Risk assessment and buffer zones for protecting residents do not apply to all products.
- b** Some routes of exposure are not taken into account.
- c** The studies included in the model are old, few in number, and the "worst case" values found in these studies are not used.
- d** The exposure durations considered in the model underestimate the real exposures.
- e** The meteorological conditions considered in the model underestimate the real exposures.
- f** The physical characteristics of people exposed according to the model are not realistic nor protective for the general population.



a

Risk assessment and buffer zones for protecting residents do not apply to all products






- ▶ Risk assessment for local residents not required for products applied by powdering and treated seeds
- ▶ No Buffer Zones applies for these products
- ▶ However... **a risk assessment for ecosystems is required for these products**
For solid plant protection products and treated and coated seeds, a risk assessment of dust drift to non-target species during application or sowing must be carried out.
- ▶ Why is there no such requirement for local residents ?



b

Some routes of exposure are not taken into account

For liquid products applied by spraying, 4 exposure scenarios for adults and 5 for children are considered in the model:

Exposure scenarios	Route of exposure	Exposure time considered
 Spray drift at the time of application	Inhalation Skin contact	No duration specified (exposure via spray drift occurs just after application)
 Volatilisation after application	Inhalation	For 24 hours
 Deposition of droplets on surfaces	Skin contact	2 hours
 Entry into a treated crops	Skin contact	15 minutes
 Hand-to-mouth transfer of contaminated objects (for children over one year only)	Oral route	

- **Exposure through inhalation of dust** is not taken into account. Yet several studies show that concentrations of contaminated dust are 4 times higher in houses located near fields than in houses further away (Source: Santé Publique France and Inserm).
- **Exposure from eating vegetables/fruit** from the garden also not taken into account

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The studies included in the model are old, few in number, and the “worst case” values found in these studies are not used

- ▶ To estimate exposure near vineyards and orchards: a single study from 1987 (Lloyd et al., 1987)... which is not accessible to the general public, is used to feed the model. EFSA itself recognizes that additional data is needed...
- ▶ Worst-case values found in the field study not used (50th percentile used instead of 95th).

Exposure by skin contact at 5 and 10 meters from orchards treated with an airblast sprayer (in mL of diluted product/person)		
	Adults	Children
50 th percentile	3.68	1.11
75 th percentile	5.63	1.69
95 th percentile	12.9	3.87

The values taken into account to calculate the total exposure (50th percentile) are 3,5 times lower than the more protective value represented by the 95th percentile.

It is therefore difficult to say that the assessment covers the “realistic worst cases”.

e



The meteorological conditions considered in the model underestimate the real exposures

- ▶ In the models used to estimate the exposure of local residents by low crops the wind speed is either unknown or $< 10\text{km/h}$ ($\sim 2,7\text{ m/s}$)
- ▶ Under real conditions in France, depending on good agricultural practice, spraying can take place at speeds of up to 19 km/h ($\sim 5\text{m/s}$).
- ▶ Comments (Public consultation 2021) from the NL authorities (RIVM):
- ▶ “Also, the wind speed parameter ‘Wind speed 2.7 m/s is not worst case as in some EU countries a maximum wind speed of 5 m/s at 2 m height or 1 m above the crop canopy is the maximum wind speed spraying allowed (within Good Agricultural Practice)”
- ▶ By underestimating the wind force that can occur in real conditions, the risk assessment greatly underestimates the exposure of residents. **We are therefore very far from the worst realistic exposure conditions** boasted by the model!



The physical characteristics of people exposed according to the model are not realistic nor protective for the general population

The calculated exposure values are “internal” exposures, after passage of the substance into the blood by skin absorption and after inhalation. They are expressed in milligrams of substance per kilogram of body weight. The physical characteristics of people, and in particular their weight, are therefore important factors for calculating exposure. The higher the weight of the people, the lower the calculated concentrations will be.

Studied group	Considered body weight
 <p>CHILDREN (group 1-3 years old covering 0-14 years old)</p>	10 kg
 <p>ADULTS (14 years and over)</p>	60 kg

0-1 year old group not well protected weight, behavior (walking on 4 legs...)

50% of boys and 75% of girls aged 1 year weigh less than 10 kg (AFPA)

Almost 80% of girls and 76% of boys aged 14 weigh less than 60 kg ! (AFPA)

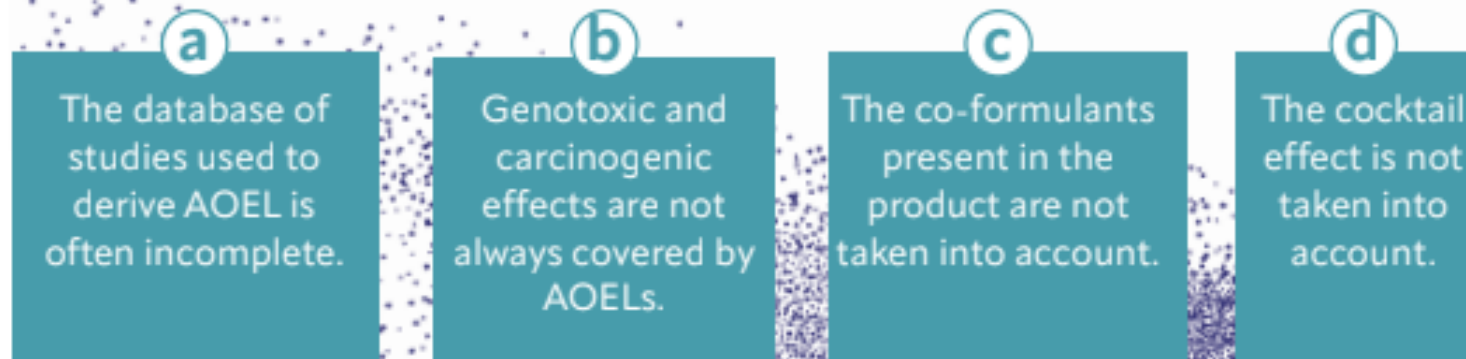
Moreover the inhalation rates considered for local residents are average daily values for people carrying out a normal, low intensity activity... -> physical activity not taken into account !

COMPOSITE SKETCH OF THE INDIVIDUALS COVERED BY THE RISK ASSESSMENT



FAILURES IN HAZARD ASSESSMENT

In parallel to the exposure assessment, the hazard assessment of substances and the derivation of health values (AOEL) also have several flaws, the main ones of which are summarized here:



It is not possible for non-threshold effects to define a safe dose like the AOEL.

The failure to take into account the co-formulants and the toxicity of the mixture adds uncertainty to the assessment.

introduction of a Mixture Assessment Factor (MAF) ?

The database of studies used to derive the AOEL is often incomplete

- ▶ The toxicology studies used to derive health values (AOEL) come almost exclusively from industry. The other available data, from the independent scientific literature, is largely ignored because these studies are not conducted according to the standards described by the OECD . Example of glyphosate :

Fate and consideration of toxicity results published in scientific journals in the RAR of glyphosate 2021.

Type of studies	Result of bibliographic search	Non relevant studies			Relevant studies		Reliable studies, usefull for evaluation. Cat A			
		Title and summary	Entire text	total	'Complementary studies' Category B	Studies usefull for evaluation (Category A)	Non reliable	Reliable with restrictions	Reliables	Used as 'Key study'
Toxicity	1550	881	311	1192	286	79	5	63	11	0
Ecotoxicity	1614	1039	412	1451	151	109	38	60	11	0
ED	4024	3654	347	4001	0	23	3	12	8	0
Total	7188	6644 (92%)			437 (6%)	211 (3%)	46	135 (1.9%)	30 (0.4%)	0%

Ref : <https://www.generations-futures.fr/wp-content/uploads/2021/11/glyphosate-evaluation-a-severely-skewed-report-v2.pdf>

Conclusions

- ▶ The assessment methods do not reflect the worst-case situations and are not protective for all product types, for all situations (wind > 10 km/h, co-exposure to several products) and all people (babies < 1 year, teenagers, women < 60 kg), etc...
- ▶ EFSA itself admits that its model is not perfect and does not take into account all possible scenarios (like in the 2014 public consultation.) **But EFSA leaves it up to national health authorities to take appropriate risk management measures, taking into account the shortcomings of the assessments.**
- ▶ And yet... **the French government's position on defining No Spray Zones is to trust the results of risk assessments carried out on a product-by-product basis: 'this is the application of science and reason and makes it possible to set appropriate and "just necessary" non-treatment distances'.**
- ▶ **Urgent reform of the risk assessment for residents needed !**

Thank you for your attention...



More on : www.generations-futures.fr

Also available : video in french https://youtu.be/Zd_QYTd8K_I