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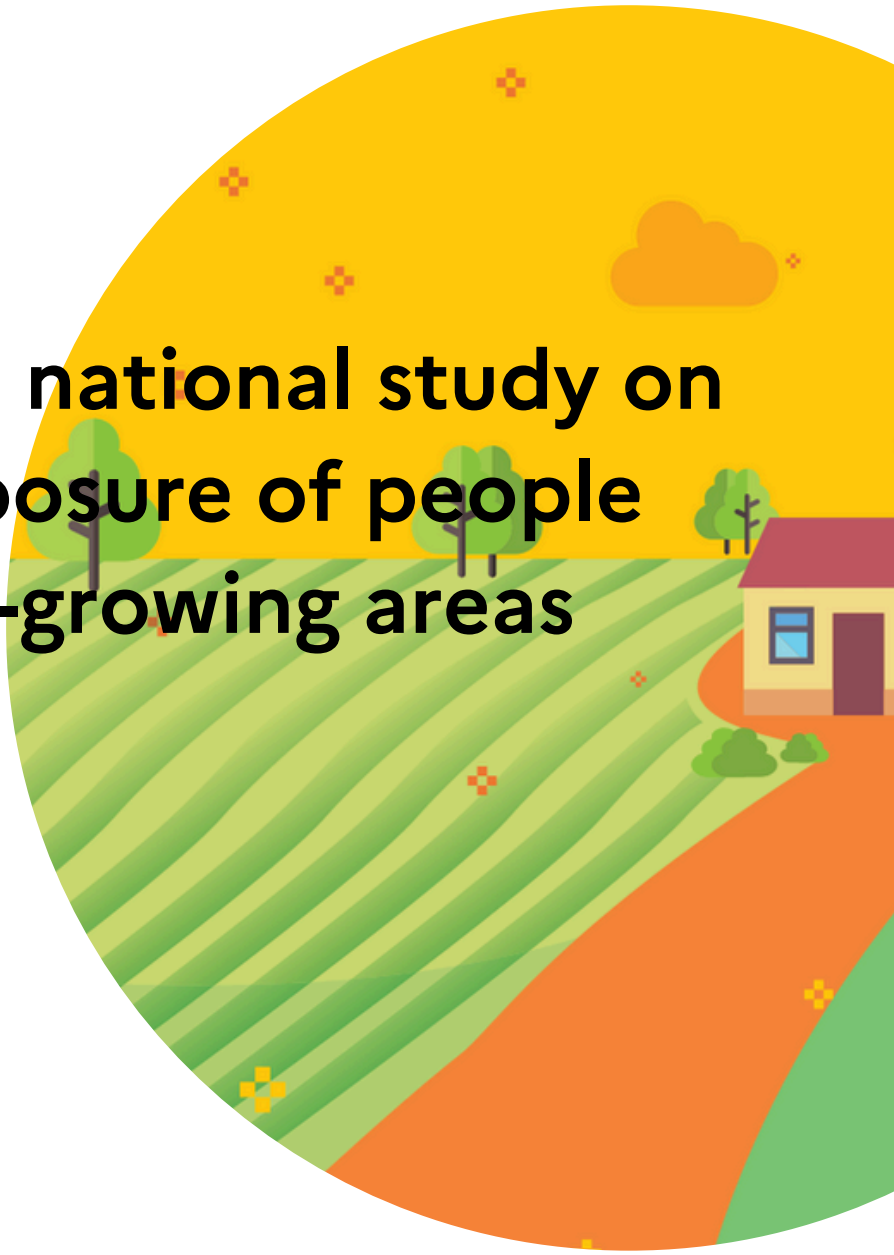

PestiRiv:

results of the national study on pesticide exposure of people living in wine-growing areas

PRESS LIAISON

***Santé publique France* :** presse@santepubliquefrance.fr
Stéphanie Champion : +33 (0)1 41 79 67 48 - Marie Delibéros : +33 (0)1 41 79 69 61
Céline Coulaud : +33 (0)1 41 79 68 22

Anses : presse@anses.fr
Nathalie Lonnel : +33 (0)1 49 77 13 77 - Shana Paquay de Plater : +33 (0)1 49 77 28 20

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Presentation of the PestiRiv study

What is PestiRiv?

PestiRiv is a study conducted jointly by Santé publique France and ANSES that sought to gain a better understanding of "real-life" exposure to pesticides in people living near vineyards. It was based on the observation that in France, data on the actual exposure of farmland residents to the active substances contained in plant protection products [1] are very limited. To address this information gap, the two agencies pooled their expertise and resources to produce a solid base of scientific data on exposure to these substances.

This is the first nationwide study to measure the exposure of people living near crops (in this case, grapevines) to substances used as pesticides, and to compare it with that of people living far away from any crops.

This study is unprecedented in its scope: the number of areas studied, the diversity of samples collected (urine, hair, settled dust, indoor air, home-grown fruit and vegetables, outdoor air) and the number of substances measured. The study has cost a total of around €11 million, funded mainly by a €7.6 million grant from the French Biodiversity Agency (OFB) under the Ecophyto 2+ plan. Additional financing came from the partners' own funds and from the tax income received by ANSES for its phytopharmacovigilance mission.

Why was viticulture chosen?

It was not possible to include all types of agricultural crops grown in France in the same study, due to differences in treatment periods and methods, substances used and areas concerned. Viticulture was chosen for a number of reasons:

- it is one of the crops subject to the greatest use of plant protection products, both in terms of treatment frequency and quantities sold;
- in France, around 4% of the population lives within 200 metres of a vineyard, and this crop is closely interlinked with human habitations;
- it is a permanent crop whose position hardly changes from one year to the next, making it easier to locate. This also means that people living near vines are repeatedly exposed to the substances used to treat these crops;

[1] Plant protection products (PPPs) are pesticides used to treat plants. Examples include herbicides, fungicides and insecticides.

- the sprayers used in viticulture and the height of the treatments are liable to promote the dispersal of products beyond the treated areas and lead to higher exposure of local residents [1];
- people living near vines have expressed concerns about their exposure to pesticides, particularly following several suspected clusters of childhood cancer.

The choice was validated by Santé publique France, ANSES and SpF's Scientific Advisory Board on farmland residents, pesticides and health, on the basis of the aforementioned criteria (treatment methods, proximity to homes, feasibility and societal issues).

What questions does the study answer?

PestiRiv measured the pesticide exposure of people living in wine-growing areas in order to answer several key questions:

1. Are people living near vines more exposed to pesticides than those living in areas far away from any crops?
2. What are the factors influencing this exposure (e.g. distance from vines, everyday behaviour)?
3. How does this exposure change according to the time of year (comparison between crop treatment periods and periods when plant protection products are not used)?
4. What are the links between the different levels of environmental contamination and the biological concentrations in people?

PestiRiv does not provide any information on the state of health of populations. Its aim was purely to measure exposure to pesticides, not to assess their health effects.

[1] ANSES opinion of 20 June 2014 on a request for scientific support to reassess the regulatory system designed to protect local residents in areas treated with plant protection products (Opinion no. 2013-SA-0206).

A study fully in line with both agencies' in-depth work on pesticides

The PestiRiv study is consistent with the scientific activities of Santé publique France and ANSES: both agencies have been working for a long time on the links between pesticides, the environment and health.

- **Santé publique France's occupational and environment health programme**

Through the national biomonitoring programme (ENNS[1], ELFE[2], Esteban[3], etc.) run and implemented by Santé publique France, the exposure of the French population to various pollutants, including pesticides, is assessed by measuring concentration levels in biological samples (urine, blood, etc.); work has also been undertaken to determine how exposure occurs and issue recommendations for reducing it.

- **ANSES's phytopharmacovigilance missions**

In 2015, ANSES set up a specific scheme: phytopharmacovigilance. This vigilance system is used to collect and analyse surveillance data relating to plant protection products. Every year, the scheme funds targeted studies to generate new knowledge, particularly on actual exposure to pesticides. This phytopharmacovigilance scheme, which aims to identify exposure and adverse health effects in "real life", complements ANSES's regulatory missions relating to the assessment of products as part of marketing authorisation applications.

A study that has set itself apart due to the scientific cooperation between different players

Santé publique France and ANSES combined their areas of expertise to carry out PestiRiv:

- Santé publique France was in charge of the study's logistics and implementation of its biological concentrations (urine, hair) component;
- ANSES led the part on environmental contamination (outdoor and indoor air, dust, garden fruit and vegetables).

Each agency drew on its groups of experts to guarantee the scientific quality of the work carried out and underpin the recommendations issued at the end of the study.

[1] National Nutrition and Health Study 2006-2007, one of whose components aimed to describe the population's exposure to certain heavy metals (arsenic, cadmium, mercury, lead) and pesticides, and identify the determinants of this exposure.
[2] The aim of the ELFE cohort study is to better understand the factors (environment, living conditions, family environment, etc.) that can impact the physical and mental development, health and socialisation of children.
[3] Health Study on the Environment, Biomonitoring, Physical Activity and Nutrition

Many scientific and technical partners also contributed to the study: the Scientific and Technical Centre for Building (CSTB), the Central Laboratory for Air Quality Monitoring (LCSQA), the National Institute for Industrial Environment and Risks (Ineris), the approved air quality monitoring associations and their national federation (AASQAs and Atmo France), the Laboratory for the Study and Research of the Environment and Health (LERES) at the School for Advanced Studies in Public Health (EHESP), the Rural Development Observatory at the National Research Institute for Agriculture, Food and the Environment (INRAE), Météo France and the National Institute for Statistics and Economic Studies (INSEE).
A number of service providers also took part in the study: IPSOS, LABÉO, Labocéa, National Institute of Public Health of Quebec, Institute for Economic and Social Research, Ianesco, Oxygenair, Certifair, Enexco, A2L Environnement, Evadies, ITGA, GIRPA laboratory, Ultra Traces Analyses Aquitaine laboratory, etc.

There were specific information campaigns on the implementation of PestiRiv for representatives of the wine-growing sector, environmental protection associations and regional health agencies (ARSs) in the regions concerned. The regional directorates for food, agriculture and forestry (DRAAFs) and national and local agricultural representatives were also asked to provide data on farming practices.

How was the study implemented?

Prior to its nationwide implementation, a preparatory phase of PestiRiv was held in 2019 in four municipalities in the Grand Est and Nouvelle-Aquitaine regions, to test the study protocol.

A national study

The study areas were selected from the whole of mainland France:

- "wine-growing areas" corresponded to environments located within 500 metres of vines and more than 1 kilometre from any other type of crop;
- "areas far away from crops" corresponded to environments located more than 1 kilometre from any crop (including any vines) and more than 5 kilometres from any vineyards.

A total of 265 wine-growing areas and areas far away from any crops were selected, spread over six wine-growing regions:

- Auvergne-Rhône-Alpes
- Bourgogne-Franche-Comté
- Grand Est
- Nouvelle-Aquitaine
- Occitanie
- Provence-Alpes-Côte d'Azur

The purpose of selecting a large number of study areas was to avoid, as far as possible, the limitations and difficulties of interpreting local studies carried out around a single site. It enabled contrasting local situations to be taken into account with a view to studying the impact of different factors on exposure (farming practices, lifestyles, weather, etc.). The results were then analysed as a whole and presented on a national scale.

Period of time covered by the study

Large-scale data collection took place between October 2021 and August 2022, to cover two periods:

- an inactive period (October to February), when plant protection treatments are infrequent;
- a period during which almost all treatments take place (March to August).

Who took part?

The PestiRiv study covered both adults (aged 18-79 years) and children (aged 3-17 years). Participants were randomly selected from their homes, provided that they were there at least 5 days a week and had been living there for more than 3 months. Participation in the study was voluntary and respondents gave their written consent. Agricultural workers who might be occupationally exposed to pesticides were also eligible to take part in the study.

A total of around 2700 people took part:

- 1946 adults (18-79 years)
- 742 children (3-17 years)

Of these people, 579 adults and 232 children living in wine-growing areas took part in both periods of the study (vine treatment and non-treatment periods).

Each participant was monitored for two weeks to collect samples and answer questionnaires. This was therefore an opportunity to document a participant's average exposure to any plant protection products used to treat vines located near their home, over the course of these two weeks.

How was exposure measured?

The various data collected were complementary and provided a detailed and full description of pesticide exposure. This approach led to a better understanding of both the exposure levels and their possible causes.

1. **Analysis of numerous biological and environmental samples**

Samples were taken from both homes and participants. The following samples were analysed:

- Urine samples collected over 14 days;
- A strand of hair to reflect average biological concentrations over the past 3 months;
- A sample of house dust collected with a vacuum cleaner over 14 days to reflect the average contamination of the home;
- A sample of indoor air collected over 7 days to reflect the average contamination of the home;
- One or more samples of home-grown fruit and vegetables to reflect their contamination.

At the same time, sampling equipment continuously measured levels of plant protection products in the ambient (outdoor) air throughout the duration of the study.

Analyses were carried out by certified laboratories selected by Santé publique France and ANSES.

2. Questionnaire-based survey

Participants completed detailed questionnaires on:

- Their food (especially garden produce),
- Their outdoor activities,
- Their occupations,
- The characteristics of their homes (presence of ventilation, etc.),
- Their behaviour in the home (airing times, housework, etc.),
- Any use of pesticides in the home (mosquito repellent, flea repellent, etc.).

This information was used to identify a wide range of factors that could explain exposure to pesticides, which may or may not be related to the proximity to vines.

3. Data on local farming practices

Data were collected to establish indicators on agricultural practices in the vicinity of homes, in particular the quantities of pesticides used on vineyard plots while participants were being monitored.

Weather conditions, particularly wind, were also taken into account to reflect the risks of products being dispersed towards homes.

What substances were screened for?

A total of 56 analytes were screened for in at least one of the sample types studied: urine, hair, dust, indoor air, fruit and vegetables, and outdoor air.

The aim of screening for a wide range of substances was to cover, as far as possible, all the types of treatments potentially used on vines.

The substances screened for covered three major classes of plant protection products used to treat vines: fungicides, insecticides and herbicides.

The analysed substances were all authorised for treating vines at the time the samples were collected (2021-2022), with the exception of four substances[1] whose regulatory status changed between the substance prioritisation phase (2018) and the beginning of the field survey.

Among the 56 substances analysed:

- Some are highly specific to viticulture (folpel and metiram, for example);
- Others are also used on other crops (glyphosate, fosetyl-aluminium and spiroxamine, for example);
- Some are also used as biocides, i.e. for disinfection or to control pests for non-agricultural purposes (e.g. pyrethroids).

[1] Chlorpyrifos-methyl, quinoxyfen, thiamethoxam and triadimenol

Main results

Higher exposure in wine-growing areas

In all the sample types studied (urine, hair, indoor air, outdoor air, dust), exposure to pesticides was **higher overall for people living near vines than for those living far from any crops**:

- For urine, dust and ambient air, contamination levels in wine-growing areas were higher than in areas far away from any crops. For example, the increase in urinary concentrations was between 15% and 45%, while the increase in dust contamination varied, depending on the substance, from a few percent to over 1000%;
- For hair and indoor air, the analytes were found more often in samples collected in wine-growing areas than in areas far away from any crops.

Greater exposure in wine-growing areas during the treatment period

Similarly, in all the sample types studied, **exposure to pesticides was greater overall during the vine treatment period** (March to August) than outside it:

- For urine, dust and ambient air, contamination levels during the treatment period were higher than during the non-treatment period. For example, the increase in urinary concentrations was as much as 60%, while the increase in dust contamination varied, depending on the substance, from a few percent to 700%;
- For hair and indoor air, the analytes were found more often in samples collected during the treatment period than in those taken during the non-treatment period.

Factors influencing exposure to pesticides in wine-growing areas

Agricultural practices were found to be the main factors determining exposure to pesticides. Exposure increased in line with:

- a decrease in the distance between the home and the vines;
- an increase in the quantity of pesticides used to treat vines.

Since exposure is linked to the presence of pesticides in the environment, it increased when people spent more time outdoors and when they aired their homes.

On the other hand, certain everyday actions and adaptations in the home helped to limit exposure: taking shoes off before entering the house, cleaning floors with a mop or vacuum cleaner at least once a week, drying clothes indoors during the treatment period, peeling home-grown fruit and vegetables before eating them, limiting the consumption of eggs from domestic hen houses in farming areas, using a mechanical ventilation system.

These results alone cannot determine the health risks

The PestiRiv data provide important information for objectively determining exposure to pesticides in wine-growing areas, quantifying it and identifying the factors on which action can be taken to reduce it. However, **they do not provide information on the state of health of populations**, nor are they sufficient in themselves to determine the health risks associated with exposure. This is because assessing these health risks would involve comparing the exposure levels with the toxicity reference values that indicate whether or not there is a health risk, and this analysis has not yet been carried out on the PestiRiv data.

Nor is PestiRiv intended to provide information for determining buffer zones. These distances are based on the health risk assessments carried out when marketing authorisation applications for plant protection products are examined. Any risks to the population and the environment must be assessed when these authorisation applications are examined.

Even if PestiRiv cannot give us specific insights into the risks associated with the observed exposure, its results – in particular, how proximity to crops influences environmental contamination and biological concentrations in people – **call for action to be taken to limit the exposure of local residents**.

Recommendations for limiting exposure

Although further work needs to be conducted, the data collected are **sufficient to guide policies to reduce the risks associated with pesticides** for both local residents and professionals.

In light of the study's results, Santé publique France and ANSES have formulated a number of recommendations for reducing the population's exposure to pesticides:

- **Limit the use of plant protection products to only what is strictly necessary**, through ambitious implementation of the Ecophyto 2030 national strategy. By definition, these products are toxic to living organisms. Even if they have been assessed in order to determine safe conditions of use, it is advisable to limit their use in order to guarantee a high level of protection for public health and the environment;
- **informing residents before treatments are carried out** would enable them to avoid the most immediate exposure (e.g. by closing windows or bringing laundry indoors).

While certain behaviour can limit exposure in the home, preventing the exposure of farmland residents **should not rest primarily on individual measures**.

The two agencies also recommend that **research be continued** to improve the characterisation of exposure through measurements in environmental and biological samples (particularly hair).

Recommendations that can be extrapolated to other crops

These recommendations **can be extrapolated to other crops**. They concern substances that are not unique to the treatment of vines and, moreover, studies conducted in other countries on other types of crops (for example wheat and soy in the United States or flowers in the Netherlands) have found the same trends as those observed in PestiRiv.

Need for a database on the use of plant protection products

In their conclusions and recommendations on PestiRiv, Santé publique France and ANSES also reiterated **their need to access the data required** to carry out their missions. They are therefore calling for the actual data on the use of plant protection products to be made available.

A national, centralised, accessible and regularly updated database on the products used, the quantities involved and the application periods would help to identify the links between actual applications and transfers to the environment, with a view to better controlling the exposure of local residents.

Outlook and additional uses for PestiRiv data

The PestiRiv study provides a **solid basis for improving knowledge of pesticide exposure** in populations living near agricultural areas.

The following additional work is planned:

- initially, investigating the links between exposure and health effects by cross-referencing PestiRiv data with the results of studies provided in support of marketing authorisation applications;
- subsequently, examining the feasibility of assessing any health risks associated with the exposures measured by PestiRiv;
- gaining a better understanding of the links between environmental contamination and biological concentrations in humans;
- improving knowledge of exposure mechanisms and determining the levels of biological concentrations that may be associated with health risks, by comparing the PestiRiv results with those of other studies;
- describing co-exposures to plant protection substances and their overlapping withother risk factors, with a view to any future risk assessments incorporating the concept of the exposome.

How have the results been presented?

The results and their interpretations are presented in the following study reports:

- a report on the study methodology: reminder of the protocol, description of the analytical methods and review of sample collection;
- a report on the results relating to environmental contamination: concentrations of substances in outdoor air, dust and air inside homes, and garden produce; comparisons of levels measured according to area and period; research into factors associated with contamination;
- a report on the results relating to biological concentrations: concentrations of substances in participants' urine and hair; comparisons of levels measured according to area and period; research into factors associated with biological concentrations.

Lastly, a joint opinion from the two agencies based on the conclusions and recommendations drawn from the study results by:

- Santé publique France'sExpert Committee on "Environmental and occupational health",
- ANSES's Expert Committee on "Assessment of the risks related to air environments".

A report setting out the detailed study protocol had already been published when the study was launched.

The results of PestiRiv's measurements, which will be referenced on the Green Data for Health (GD4H) platform, will also be made available to the scientific community.