

SIRIS-Pesticides:

Validation of a tool to aid decision making for monitoring pesticides in freshwater

SIRIS-Pesticides is a tool used to classify pesticides according to their potential to reach surface and underground freshwaters. It is a tool to help decision making for managers wishing to draw up a list of active substances to:

- be monitored in priority for evaluating the quality of water at a water capture point or in an environment;
- target a little number of pesticides to be analyzed and limit the cost of monitoring.

The only input data needed for using this tool are the area of the territory concerned and the quantities of substances spread within this area. The other information required for calculation is provided in two databases linked to the tool. SIRIS-Pesticides classifies the substances to monitor in water over a standardized scale from 0 to 100. Active substances with the highest rank are those with the greatest potential for reaching the water. Compared with field measurement reports, SIRIS-Pesticides results were found to be robust by the members of the project steering committee.

SIRIS-Pesticides two databases

SIRIS-Pesticides 2006 database

~ 400 substances listed (with complete a set of data).

► **Descriptive information**

- name
- CAS number
- SANDRE number
- Chemical family
- type of biological activity
- known metabolites

Commercial product database

~ 10 000 commercial products listed

- Commercial name
- French market number
- Quantities of substances in each product
- CAS number of the substances listed

SIRIS-Pesticides method

Five parameters are used to evaluate the exposure:

- Koc, partition coefficient of the contaminant in the organic fraction of the soil (L.g⁻¹),
- Solubility (mg.L⁻¹),
- DT50_{soil} in field (d),
- Hydrolysis (qualitative data: stable, instable, very stable),
- Quantities sold or applied over the study area (only data provided by the user).

Parameters are grouped in classes. Classes are organised in hierarchy. Thus, the most important parameter influences the score given to less important ones.

Parameters, classes and hierarchy

	Class 1	Class 2	Class 3	Class 4
Surface freshwaters	Quantities	Solubility	DT50 _{soil}	Koc
			hydrolysis	
Ground freshwaters	Koc	DT50 _{soil}	Quantities	Solubility
		hydrolysis		

Each parameter is affected to one level reflecting its contribution to exposure. Up to 5 levels are defined from the most to the least favourable situation with regard to the mobility of the substance toward aquatic environments. They are indicated by one letter: o, e, m, s, and d.

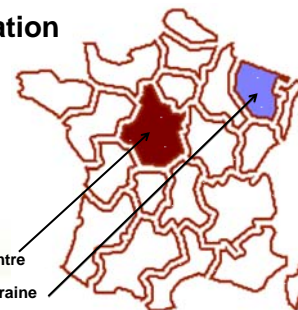
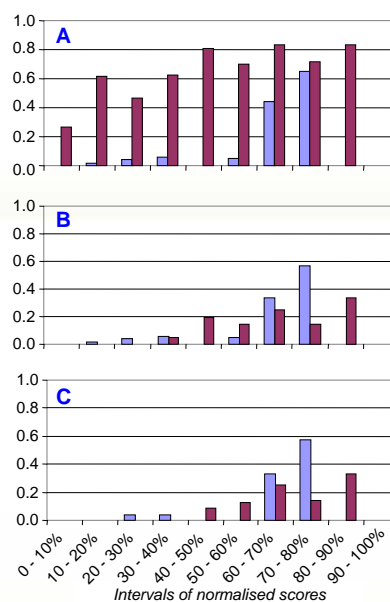
The ideal substance has all its parameters at a o level. Its score is 0. Less ideal substances get penalties and their score increases. Scores are attributed to each possible combination of levels, according to strict calculations rules. With those combinations, a penalty grid is built. Scores are normalised to 100 to ease comparison between classifications. The penalty grid below shows that a substance whose mobility is noted « d d m d » gets a normalised score of 88.7%.

Class 1	Class 2	Class 3	Class 4	Score	Normalised to 100
o	o	o	o	0	0.0%
o	o	o	m	0.5	0.8%
o	o	o	d	1	1.6%
o	o	m	o	3	4.8%
o	o	m	m	4	6.5%
d	d	md	m	50	80.7%
d	d	md	d	55	88.7%
d	d	2d	o	51	82.3%
d	d	2d	m	56.5	91.1%
d	d	2d	d	62	100.0%



<http://www.ineris.fr/siris-pesticides/>

SIRIS-Pesticides validation



Graph A shows that in the « Centre » region analysis are carried out, whether the substances may be considered as dangerous or not. This may be caused by the use of multi-residue analysis techniques.

There is a better selectivity in the « Lorraine » region where the SIRIS méthode has been used for several years.

Graphs B and C show that SIRIS-Pesticides method correctly classifies as priority substances those pesticides that are often found in waters. Most of these substances were found at least once at concentrations > 0.1 µg.L⁻¹.

Conclusions

SIRIS-Pesticides is now fully computerised and on-line
 (<http://www.ineris.fr/siris-pesticides/>).

Scores are comparable from one region to the other.

- Scores could be normalised between 0 and 100.
- All quantities used are normalised to the surface of the study area.

A conversion of quantities of French commercial products to quantities of substances is possible.

SIRIS-Pesticides results have been compared with monitoring data.

Acknowledgements

This project has been successfully carried out thanks to the supervision of a steering committee. It consists of persons from national and local authorities, potential users of the tool, representative of the pesticides manufacturers and water authorities.

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