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FOOTPRINT

Functional Tools for Pesticide Risk Assessment and Management

Specific Targeted Research Project

Thematic Priority: Policy-orientated research

Deliverable DL24

Pesticide database holding fate and ecotoxicological values

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PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Foreword

The present report was prepared within the context of the work package WP5 (Development of Functional Tools) of the FOOTPRINT project (http://www.eu-footprint.org).

The preferred reference to the present document is as follows:
Lewis K., Green A. & Tzilivakis J. (2007). Pesticide database holding fate and ecotoxicological values. Report DL24 of the FP6 EU-funded FOOTPRINT project [www.eu-footprint.org], 28p.

Executive summary

The principal aim of this work was to develop a database of fate and ecotoxicological data which will be used to support the three FOOT tools. The database was made available on the internet as an online resource open and free-of-charge to all interested parties (www.eu-footprint.org).

An initial review of existing databases with regard to environmental fate and ecototoxicological properties of pesticides revealed that existing resources did not meet the expectations of the FOOTPRINT project with regard to completeness and overall quality. In addition the review identified issues associated with format, updating, maintenance and language barriers.

The objectives of the FOOTPRINT PPDB were to provide:

- a single, comprehensive resource of reliable, consistently presented pesticide data,
- simple on-line access supported by layperson interpretations and user tools,
- a portable format for direct linking to software applications.

The FOOTPRINT PPDB currently holds ~700 pesticide data records and 350 additional records for their major metabolites. The database includes general information, physico-chemical and environmental fate data, acute and chronic endpoints for a range of fauna and flora and information on human health issues. Data are maintained regularly and the range of pesticides and data held are under constant review. Data have been cross-checked against a number of other resources and agreements to share data with holders of other databases have been put in place.

An indication of data quality and 'fitness for purpose' is provided by assigning each parameter with a confidence code that reflects the data source and the confidence database administrators have in the value.

Monitoring of visits of the FOOTPRINT PPDB web page suggests that the resource is extremely useful to a large range of individuals involved in pesticide risk assessment activities throughout the globe.

1 INTRODUCTION

The demand for detailed data on the physico-chemical and toxicological parameters of pesticides has grown considerably over the last couple of decades. This is, in part, due to more stringent regulatory controls and the use by regulators, policy makers and others of data-hungry modelling and risk assessment approaches.

Although it is difficult to be precise there may be as many as 1000 pesticides available globally. Many have been withdrawn from the European market by the ongoing review process (Directive 91/414), but it is not unusual for an individual European State to have around 300 pesticides registered for use at any given time. For example, it is estimated that approximately 330 active ingredients are currently registered in the UK, 380 in France and 250 in Germany. A wide range of parameters are required depending on the type and purpose of the application being used. It would not be unreasonable to suggest that a minimum of 6 to 10 parameters are required to calculate predicted environmental concentrations. In addition, ecotoxicological threshold values are needed for mammals, birds, earthworms, honey bees and aquatic species (e.g. fish, invertebrates, lower and higher aquatic plants). Therefore one might need up to 18 parameters for each pesticide studied, 6000 for all registered pesticides within one European State and potentially 18000 to study the full range.

It would appear, at first glance, that these data are readily available via a diversity of sources including government departments, manufacturers, universities and environmental bodies. One may also assume that the Internet has made access to these data simple, fast and unproblematic. Both assumptions are incorrect. Most of the datasets currently available are extremely limited regarding the range of pesticides they cover. As may be expected, national datasets are usually constrained to those pesticides registered for use in a particular country. Table 1 summarises the main resources which have been identified as of late 2006. From the table it can be seen that most datasets have around 200-400 records. However, there is a great deal of overlap in the active substances covered and most suffer from large gaps in information and presentation inconsistencies. Consequently, other sources of information, of which there are many, are essential.

Some datasets are comprehensive regarding the types of data they contain (e.g. environmental fate, human health). However, for the majority of pesticides, different datasets must be interrogated for different data types. For example, IPCS INCHEM might be used for basic chemical information such as molecular mass and structure, the ECOTOX database might be searched for ecotoxicological information and medical databases interrogated for information on human health. There are also commercial databases that contain comprehensive datasets,

but these require annual subscriptions and are rarely available for direct linking to software applications without payment of significant licence fees.

Resource name	No. records	Data type[#]	Comments
91/414 EU / EFSA Evaluation Dossiers	140/ 110	A, B, C, D, E	• ec.europa.eu/food/plant/protection/evaluation/index_en.htm. • www3.efsa.europa.eu/DAR/displaySubstance.cfm
ACP Evaluation Documents UK	170	A, B, C, D, E	• www.pesticides.gov.uk/publications.asp?id=202 • Some documents are quite old & have limited data
AGRITOX, France	370	A, B, C, D*, E	• www.inra.fr/internet/Produits/agritox/php/fiches.php?PHPSESSID=ae0e236e3de4999ae0f50e9ef45eada7
UK Pesticide Manual 14th Ed	880	A, B, C, D*, E	• Commercial, priced publication • Variable useful content. Significant data gaps.
PAN Pesticides Database, USA	Large dataset	A, B, C, D*, E	• www.pesticideinfo.org/Index.html • Not user friendly. Mainly portal links, large data gaps
EXTOXNET, USA	180	A, B, C, D, E, F	• extoxnet.orst.edu/ghindex.html • Poor presentation which can undermine data integrity
US EPA Pesticide Factsheets	77	A, B, C, D, E	• www.epa.gov/opprd001/factsheets • Mainly new actives
US EPA ECOTOX Database / Fate Database	Large dataset / 189	E / A, B, C	• cfpub.epa.gov/ecotox/ • cfpub.epa.gov/pfate/Chem_details.cfm • Needs careful choice of data best fit for purpose
PMRA Pesticide Factsheets, Canada	70	A, B, C, D*, E	• www.pmra-arla.gc.ca/english/pubs/prdd-e.html • Limited dataset
PIC Decision Guidance (DGD) Documents, FAO	350	A*, B*, C*, D, E*	• www.pic.int/en/Table7.htm • DGD produced for chemicals listed in Annex III, Rotterdam Convention on Hazardous Chemicals & subject to a PIC. • Mainly banned or severely controlled pesticides
Pandora, NL	225	A*, B, C, E	• Research report RIVM no. 679101014 (1994) • Quite old, report may not still be available
KingTai Chemicals Datasheets	60	A, B §	• www.kingtaichem.com • Very slow website, but does contain some useful data
ChemIDPlus, USA	Unknown	A §	• Chem.sis.nlm.nih.gov/chemidplus • Need CAS number to search, Useful for basic information
Pesticide Data Tables, Danish EPA	400	A, B, C, E†	• www.mst.dk/udgiv/publications • Good data source, but not referenced
European Chemicals Bureau	Unknown	D	• http://ecb.jrc.it • Only EU registered pesticides available – many gaps in data
IPCS INCHEM	Unknown	A	• www.inchem.org/

Table 1: Summary of the main pesticide data resources (2006 data)

Definition of data types: A – general data, B – physico-chemical, C – fate, D – human health, E – ecotoxicological
* Limited range of parameters held, § Very limited range of other data types held, † Aquatic ecotoxicolgical endpoints only

The format of presentation is also very variable ranging from tabular to narration. The latter are common and these are useful as they place the data in context. However, researchers needing specific parameters must search each document and collate their own datasets,

especially if they wish to make the data available to software applications. This process is very slow and invites typographical errors.

The Internet has dramatically altered the way information is distributed and shared and has become an important research tool. However, due to its loose, forever changing structure, free of content management, it can be very difficult to locate information relevant to a specific topic. Unlike bibliographic databases it does not provide an index or contents page. Language barriers can also hinder the use of potentially valuable sites. Whilst many pesticide common names are similar from one language to the next, slight variations can cause search tools to fail. The Internet has no structural boundaries, no standard method of organisation and information available today may not be available tomorrow or necessarily stay at the same URL. There is also little peer review control and judging data credentials, i.e. fitness for purpose and accuracy, can be problematic. For example, most of the physico-chemical and toxicological data needed have a natural variability often dependent on the conditions under which they are measured. In some instances the natural data range can be large and the value selected may have a significant influence on the risk assessment outcome. This is not to mention the unavoidable errors that creep into datasets such as typographical mistakes or problems associated with units of measurement. There is also the question of data maintenance - some resources were collated some time ago and are not updated. An important issue is that the quality and utility of data should not be separated from its purpose and intent. Any simulation is only as good as the underlying data.

Consequently, there is a serious need for a single authoritative source to capture, archive, validate, manage, maintain and provide access to data for the majority of pesticides available world-wide for pesticide risk assessments. The FOOTPRINT Pesticide Properties Database (FOOTPRINT PPDB) recently launched solves many of the problems discussed here.

2 DATABASE PURPOSE, DESIGN AND DEVELOPMENT

The origins of the FOOTPRINT PPDB can be traced back to 1994 to the development of the award-winning Environmental Management for Agriculture (EMA) software (Lewis & Bardon, 1998). This software package included a suite of decision support tools to help UK farmers improve their environmental performance and included a pesticide risk module with an embedded pesticide database (Lewis et al., 2003). The pesticides within the database were restricted to those active substances registered for use in the UK and included both physico-chemical parameters and ecotoxicological data. The EMA software and the pesticide database have been constantly maintained and updated and are still available today. However, recent

EU funding for a new approach to pesticide risk assessment (FOOTPRINT – Functional Tools for Pesticide Risk Assessment and Management, www.eu-footprint.org) has provided the opportunity to re-assess the database in terms of i) the range of pesticides covered; ii) the data stored; and, iii) their 'fitness for purpose'.

The objectives of the new FOOTPRINT database is to provide:

- a single, comprehensive resource of reliable, consistently presented pesticide data having common syntax, units and semantics
- a portable format for direct linking to software applications such as risk assessment systems
- on-line access using a simple tabular format supported by layperson interpretations and user tools.

If the new database was to provide a solution to many of the problems experienced by users of pesticide data then it was essential that the data stored was suitable for a wide range of applications and different user types. To this end the data stored covers:

- **General information.** For example common and chemical names, language translations, chemical group, formula, structures, pesticide type, CAS/EC numbers and data related to country registration.
- **Physico-chemical data.** Including solubility, vapour pressure, density, dissociation constants, melting point and information on degradation products.
- **Environmental fate data**. For example the octanol-water partition constant (Log P), Henry's law constant, degradation rates in soil, sediments and water (DT_{50}), the Freundlich sorption coefficient (Kf) and exponent (nf) and the organic-carbon sorption constant (K_{oc}).
- **Human health information.** This includes World Health Organisation toxicity classifications, Acceptable Daily Intakes (ADI), Maximum reference dose (ArfD), toxicity to mammals, other exposure limits and toxicity endpoints, plus the EC risk and safety classifications, maximum concentration in drinking water (MAC).
- **Ecotoxicology**. For example, acute and chronic toxicity data for a range of fauna and flora plus information on bioaccumulation.

Two distinct user types have been identified: (i) those requiring large datasets for software applications such as risk assessments and (ii) users seeking specific data items or data on a specific chemical. Microsoft Access 2000 Database format has been selected as the primary storage method. It is probable that this format will satisfy the requirements of users needing to embed datasets into software applications. The database is then streamed through various 'data filters' for formatting into HTML pages for online access and translation from English

language into a range of EU languages. This process helps simplify the updating and maintenance process.

The online version of the database has various user tools available including a search feature that can identify a pesticide record by active substance, common name (in any of the EU languages offered), alternative names or the chemical registration number (CAS RN). There is also a full index page and direct electronic links from parent chemicals to their metabolite data pages. To enable laypersons to use the on-line resource standard interpretations of the data are offered as hazard classifications. In most cases the thresholds used are those used for regulatory purposes or are 'rules of thumb' in wide and general use such as the guidelines used by the UK pesticide industry for developing Pesticide Environmental Information Sheets. Two risk indicators have also been calculated from the available data: (i) the GUS Index for groundwater leaching potential (Gustafson, 1989) and (ii) a measure of particle bound transport which indicates the pesticides risk of being transported with runoff (Goss and Wauchope, 1990).

3 DATA COMPILATION

Probably the best sources of information currently available for pesticide properties are the monographs produced as part of the EU review process and data within these documents has been first choice for populating the database. Where EU documents are not available, alternative sources have been used including:

- Databases and documents from the EU and national government departments including the UK's PSD, Germany's Federal Environment Bureau, the Danish Environmental Protection Authority, the US EPA and the French registration authorities (Agritox)
- On-line databases e.g. ARIS, EXTOXNET, ARS/OSU, PAN, AGRITOX (see Table 1)
- Manufacturers safety datasheets and environmental fact sheets, on- and off-line
- Hardcopy, peer reviewed scientific publications and data derived from research projects.

As the primary purpose of the database is risk assessment, data have been selected for this particular use. The values quoted for physico-chemical properties are usually a mean of the various studies identified. Where a parameter is particularly sensitive, to climate or soil for example, information on the data range has been added. Where a parameter is just naturally very variable, we have attempted to select the most appropriate value for EU conditions. For ecotoxicological data, the 'worst case' value has been selected unless it appears wildly out of character with the majority of studies published. The data relate to specific species and endpoints, where possible, to ensure a harmonised and balanced dataset.

The FOOTPRINT PPDB has been extensively cross-referenced against other datasets as an evaluation exercise. This has helped to identify erroneous and inconsistent data highlighting the need for further investigation and further consultation of the original data source (rather than the dataset).

The accuracy of the data always challenges the accuracy of the model or risk assessment system. No matter how good the model is, the outcome of the modelling will only ever be as good as the input data. Due to the importance of the quality aspects, a 'code' has been attached to all data contained in the FOOTPRINT PPDB with information on the source of the data and on the confidence that should be assigned to them. Confidence values are in the range 0 (very little confidence) to 5 (reliable data) and are a function of the data source, publication date, referencing, the match to the desired parameter and fitness-for-purpose. For example, avian toxicity data taken from a recent EU dossier that exactly matches the endpoint required (e.g. acute oral LD_{50} mallard) would be assigned A5. 'A' indicates the source as an EU dossier and '5' indicates high confidence in the data quality. However, a soil DT_{50} extracted from an ad-hoc publication which gives no details of the original data source or the conditions under which the data was collected would be assigned Q1. 'Q' being the reference code for miscellaneous documents and '1' referring to the poor level of data confidence. It should be remembered, however, that the process of confidence scoring is somewhat subjective in nature and only meant as a guide. A low score does not, necessarily, indicate inaccurate or poor data. Full details of the quality and source codes can be found on the database web site.

4 COMPARISON WITH OTHER RESOURCES

The FOOTPRINT PPDB currently holds approximately 700 pesticide data records and a further 350 records for associated metabolites (Appendix 1). Table 2 provides information on gaps for the main parameters and provides a rough comparison with sub-sets of 100 records taken from two other datasets. Records for the subsets were randomly selected and only the presence of numerical data has been counted. Qualitative statements (e.g. high, low) have been ignored as they cannot be used as data input with any accuracy.

Parameter	FOOTPRINT PPDB	AGRITOX	EXTOXNET
Number records examined/total	700/700	100/370	100/180
Presentation style	Tabular	Tabular	Narration
General description & generic name	100%	100%	100%
CAS RN Number	100%	99%	99%
Chemical formula	100%	94%	0%
Molecular mass	100%	94%	100%
Structural picture	97%	51%	0%
Relative density / bulk density	78%	0%	2%
pKa	33%	32%	0%
Aqueous solubility	97%	90%	94%
Solubility in organic solvents	75%	81%	6%
Partition Coefficient Log P	95%	77%	58%
Vapour Pressure	94%	85%	84%
Henry's constant	87%	59%	0%
Soil DT50	86%	64%	85%
Sorption Coefficient Koc	80%	44%	84%
Aqueous photolysis DT50	49%	37%	30%
Neutral hydrolysis DT50	66%	86%	34%
Water-sediment system DT50	45%	25%	0%
Bioconcentration data	45%	18%	58%
Ecotoxicity – mammals	99%	97%	97%
Ecotoxicity – birds	87%	82%	88%
Ecotoxicity – acute fish	93%	84%	92%
Ecotoxicity – acute aqueous invertebrates	89%	76%	10%
Ecotoxicity – honeybees	76%	74%	40%
Ecotoxicity – earthworms	56%	46%	9%
Ecotoxicity – algae	75%	61%	0%
Ecotoxicity – higher aquatic plants	39%	14%	0%
Toxicity – oral mammals	99%	97%	97%
Toxicity – WHO classification	100%	0%	0%
Toxicity – EC Risk & safety classifications[§]	58%	0%	0%
Average % across record set	78%	61%	44%

Table 2: Comparative analysis of the FOOTPRINT PPDB and two other databases in terms of availability of the data

5 DATABASE ACCESS AND CURRENT USAGE

The Microsoft Access database on CD is available to all individuals subject to an administration fee and, if it is to be used with software that will be distributed for third party or commercial use, a modest licence fee. The fees include database updates for 12 months.

A prototype on-line version of the database was launched on a free-to-all basis during 2006 via the FOOTPRINT website (www.eu-footprint.org). An example of the data provided for an active ingredient is presented in Appendix 2. In early 2007 the format and content were finalised and the database was made available more widely via ADLib (www.adlib.ac.uk) and other websites (www.herts.ac.uk/aeru/footprint). Shortly after the launch, processes were put in place to monitor activity on the site and provide user statistics. The monitoring has highlighted the fact that the database is being used extensively. Figure 1 shows user statistics for the first 28 days of the official database launch. A typical weekday approximately 200 page loads of data were downloaded with around 50 unique visitors. Figure 2 shows the same statistics for the first three months and illustrates a significant increase in visitors to the online site with typically 400-500 page loads of information being downloaded.

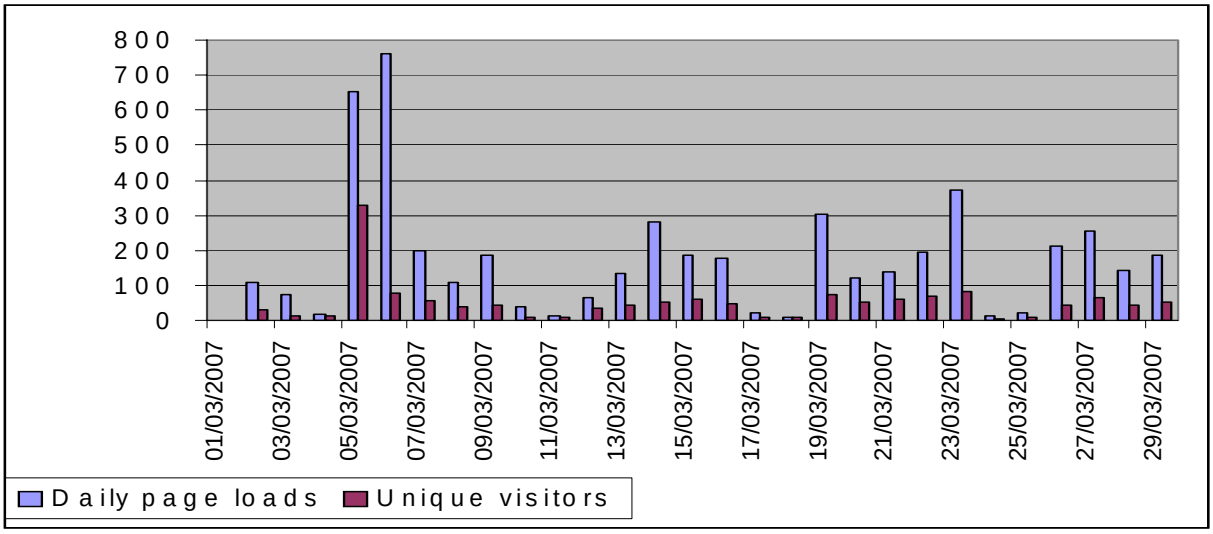

Figure 1: Database usage statistics in the first month following launch

The peak shown shortly after the launch coincides with the start of the working week and, as the statistical counters were all set to zero, shows the initial level of interest. Since this time, usage is quite steady at around 200 hits each working day. Initially, the majority of users were finding the database using Internet browsers and not via direct website links. However, current statistics indicate the site is now being bookmarked and users are returning on a frequent basis.

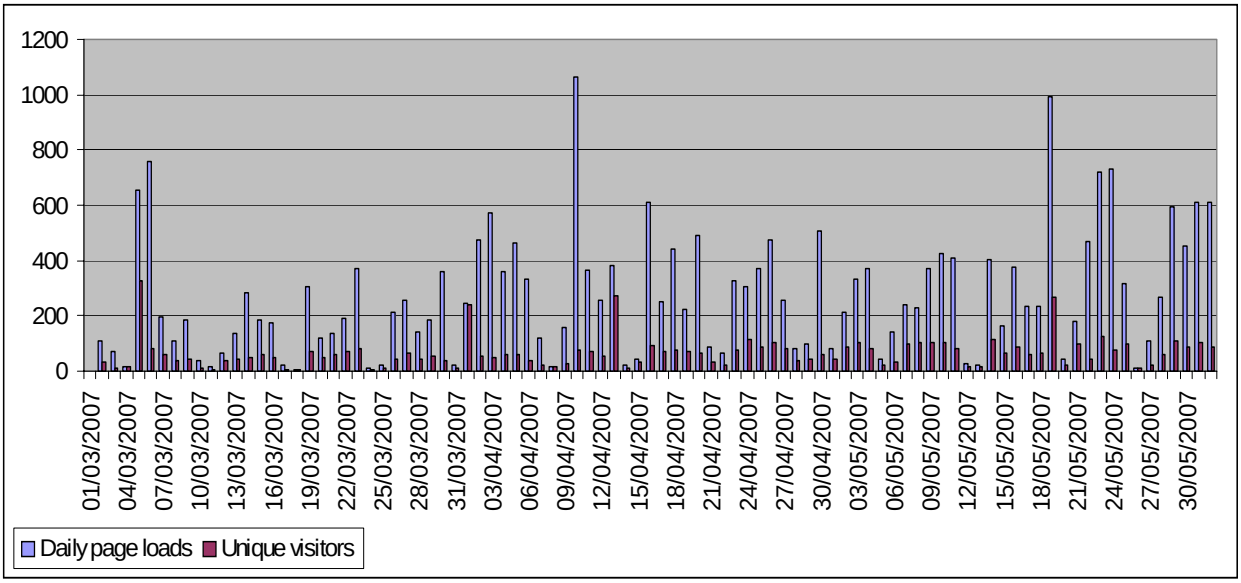

Figure 2: Database usage statistics in the first 3 months following launch

Another interesting issue is the wide range of countries being represented by users. Figure 3 shows the main areas of activity across the globe. The pink dots represent a cluster of one or more users.

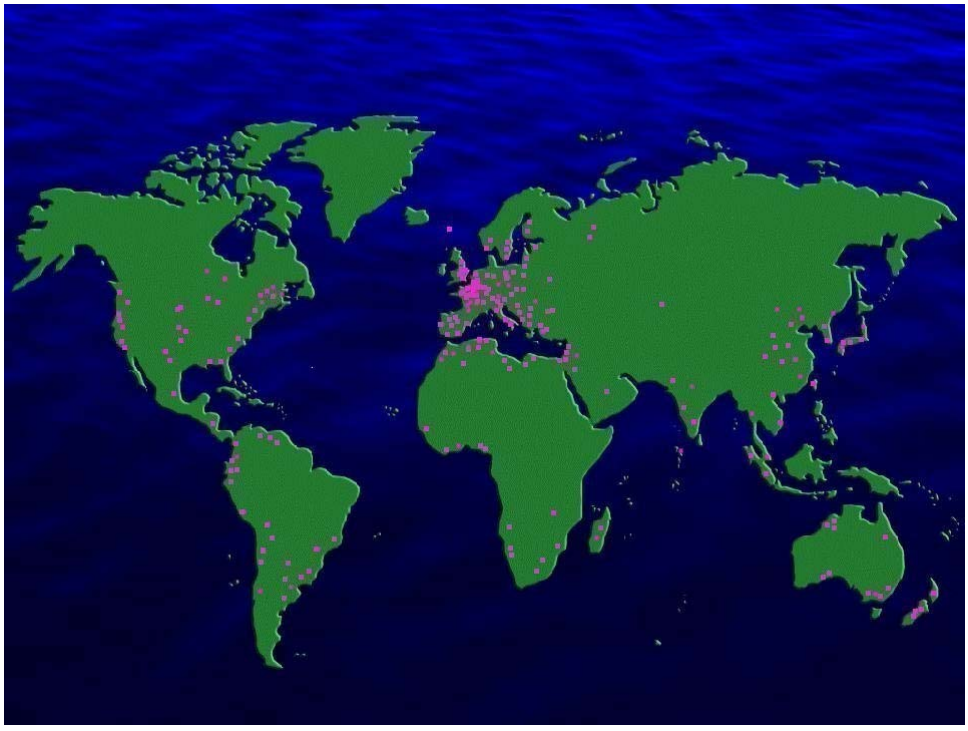

Figure 3: Geographical origin of website visitors

6 CONCLUSIONS AND PERSPECTIVES

The amount of pesticide data required for risk assessment exercises is very significant and despite the Internet and greater public availability, identifying the right data that is fit-for-purpose can be time consuming and frustrating. The Internet has often been heralded as revolutionising publishing, information sharing and research. This is undoubtedly true, but this revolution has introduced its own problems. The new FOOTPRINT PPDB does not pretend to hold full datasets for all pesticides; indeed, there are still many data-poor pesticides in use. However, basic analysis and comparison of these datasets show it to be a great improvement on existing resources bringing together the best data from the most reliable sources. Usage statistics show that the database is in global use and website activity is increasing month on month.

The MS Access database will enable external software applications to extract data directly avoiding the need for users to source and input their own data. This effectively reduces data input time and ensures that the best available data is used, helping to optimising the performance of the risk assessment process. This is the approach taken by the EU FOOTPRINT project which is currently developing a suite of harmonised pesticide risk assessment tools at national, regional and farm level. The on-line database and associated tools provide a more complete service to users. Language translations, comprehensive indices and extensive search facilities plus the layman data interpretations all contribute to a user-friendly access to the data.

7 REFERENCES

Goss D. & Wauchope R.D. (1990). The SCR/ARS/CES Pesticides Properties Database: II Using It with Soils Data in a Screening Procedure. In: D. L. Weigmann (Ed), Pesticides in the Next Decade: the Challenge Ahead, Virginia Water Resources Research Centre, Blacksburg, VA, USA, 471-493.

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Appendix 1 - List of active ingredients and metabolites listed in the FOOTPRINT PPDB in June 2006

((E,E)-methoxyimino-[2-[1-(3-trifluoromethylphenyl)-ethylideneaminooxymethyl]-phenyl]acetic acid)
(+-)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3,5,pyridinecarboxylic acid
(1R,3R,E)-3-(4-chlorobenzylidene)-5,5-dimethyl-1-((1H)-1,2,4-triazol-1-ylmethyl)-cyclopentan-1,3-diol
(4-trifluoromethoxy)phenyl urea
(6-cyclopropyl-2-phenylaminopyrimindin-4-yl)methanol
(CONH2-Fen)
(D+)-2-(4-(6-chloro-2-benzoxazolyloxy)-phenoxy)-propionic acid
(DTPU)
(E)-2-(2-[6-cyanophenoxy)-pyrimidin-4-yloxyl]-phenyl-3-methoxyacrylic acid
(E)-2-(4-chlorobenzylidene)-5,5-dimethyl-1-((1H)-1,2,4-triazol-1-ylmethyl)-cyclopentan-1,3-diol
(E)-methoxyamino(alpha-(o-tolyloxy)-o-tolyl]acetic acid
(E)-methyl 5-chloro-2,3-dihydro-2-hydroxy-1-[[[(methoxycarbonyl)[4-trifluoromethoxy)phenyl]amino]carbonyl]hydrazono]-1H-indene-2-carboxylate
(R)-2-[4-(6-chloro-quinoxaline-2-yloxy) phenoxy]propanoic acid
(TPSA)
(Z)-2-chloro-3-[2-chloro-5-(((2-hydroxycarbonyl)cyclohexen-1-yl)carbonylamino)phenyl]acrylic acid
(Z)-2-chloro-3-[2-chloro-5-(1,3,dioxo-4,5,6,7-tertahydroisoindol-2-yl)phenyl]acrylic acid
[3-cyano-4-methanesulfonyl-2-methyl phenyl](5-hydroxy-1-methyl-1H-pyrazol-4-yl)methanone
[E-o-(2-hydroxycarbonyl-5-methyl)phenoxymethyl]-2-methoxyimino-N-methylphenyl acetamide
[E-o-(5-hydroxycarbonyl-2-methyl)phenoxymethyl]-2-methoxyimino-N-methylphenyl acetamide
1-(2,4-dichlorophenyl)2-imidazol-1-ylethanol
1-(3,5-dichlorophenyl)-5-isopropyl biuret
1,2,4-triazole
1,3-dichloropropene
1-methylcyclopropene
1-naphthol
2-(3,5-dichlorophenyl)-4,4-dimethyl-5-methylene-oxazoline
2-(3-trifluoromethylphenoxy)nicotinamide
2-(3-trifluoromethylphenoxy)nicotinic acid
2,2-dimethyl-1,3-benzodioxol-4-ol
2,3,6-TBA
2,4,5-trichlorophenol
2,4-D
2,4-DB
2,4-dichloroaniline (2,4-DCA)
2,4-dichloroanisole
2,4-dichlorophenol
2,5-dichloroaniline
2,6-dichloro-1,4-phenylenediamine (DCPD)
2,6-dichlorobenzamide (M02)
2,6-dichlorobenzoic acid
2,6-difluorobenzoic acid
2-[4-(2,4-dichlorophenoxy)phenoxy] propanoic acid
2-[N-[3-((1Z)-2-carboxy-2-chlorovinyl)-4-chlorophenyl]carbamoyl]-?-hydroxycyclohex-1-enecarboxylic acid
2-amino-4,6-dimethoxypyrimidine
2-amino-4,6-dimethylpyrimidine
2-amino-4-methoxy-6-methyl-1,3,5-triazine
2-amino-4-methylsulfonylbenzoic acid (AMBA)
2-aminobenzimidazole
2-aminobutane
2-amino-N-isopropylbenzamide
2-butanesulfonic acid (BSA)
2-chloro-4-methylsulfonyl-benzoic acid (CMBA)
2-dodecyl-3-hydroxy-1,4-naphthoquinone
2-ethylsulfinyl ethane sulfonic acid
2-hydroxy alachlor
2-hydroxy-3-fluoro-5-chloro-pyridine

2-hydroxyquinoxaline
2-isopropyl-4-methyl-6-hydroxypyrimidine
2-methyl-4-chlorophenol
2-pyrroline-3-carbonitrile,4-bromo-2-(4-chlorophenyl)-5-(trifluoromethyl)-chlorfenapyr
3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylic acid (DCVA)
3-(3-chloro-p-tolyl)-1-methylurea
3-(4,5-dihydro-isoxazol-3-yl)-4-methanesulfonyl-2-methyl-benzoic acid
3-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol
3-(ethylsulfonyl)-2-pyridinesulfonamide
3,3-dichloro-4,4-dimethylazobenzene
3,4-dichloroaniline
3,5,6-trichloro-2-pyridinol (TCP)
3,5-dichloro-2,4-difluorophenylurea
3,5-di-iodo-4-hydroxybenzamide
3,5-di-iodo-4-hydroxybenzoic acid
3,6-dichlorosalicyclic acid
3-aminophenyl N methylcarbamate
3-chloro-4-methylaniline
3-chloro-5-trifluoromethyl-pyridine-2-carboxylic acid (M03)
3-chloro-8-quinoline-carboxylic acid
3-chloroallyl alcohol
3-formamidophenyl methylcarbamate
3-hydroxycarbofuran
3-hydroxyformanilide
3-hydroxymethyl sulfentrazone (N-[2,4-dichloro-5-[4-(difluoromethyl)-yl]pheny]methanesulfonamide
3-hydroxyquinoxyfen
3-ketocarbofuran
3-methyl-4-nitrophenol (NMC)
3-phenoxybenzoic acid
3-trifluoromethylbenzoic acid (TFMBA)
4-(1,1-dimethylethyl) benzene ethanol
4-(4-chlorophenyl)-2-(methyl-1H-1,2,4-triazole)-4-oxo-2-phenylbutanenitrile
4,4-dibromobenzilic acid
4,5-dihydro-5-hydroxy-6-methyl-4-[3-pyridinylmethylene)amino]-1,2,4-triazine-3-(2H)-one
4,5-dimethyl-thiophene-3-carboxylic acid allyamide
4,6-Bis(amino)-2-chloro-s-triazine
4,6-dimethoxypyrimidine-2-yl-urea
4-amino-2-[3-(4,6-dimethoxypyrimidin-2-yl)ureidosulfonyl]-N, N-dimethylbenzamide
4-amino-2-chloropyridine (ACP)
4-amino-3,5-dichloro-6-fluoro-2-pyridinol
4-amino-3,5-dichloro-6-fluoro-methoxypyridine
4-chloro-2-methylphenol
4-chloro-5-p-tolylimidazole-2-carbonitrile (CCIM)
4-chloro-5-p-tolylimidazole-2-carboxamide (CCIM-AM)
4-chloro-5-p-tolylimidazole2-carboxylic acid (CTCA)
4-chlorophenylurea
4-chloroprothiofos
4-CPA
4-fluoro-3-phenoxybenzoic acid (FPBacid)
4-fluoro-3-phenoxybenzoic acid (FPBsyra)
4-hydroxy saccharin
4-hydroxy-2,5,6-trichloroisophtalonitrile
4-hydroxyquinazoline
4-methoxybiphenyl
4-N-[3-chloro-5-trifluoromethyl-pyridin-2-yl-(hydroxyl)methyl]-2,6-dichlorobenzamide (M01)
4-tert-butyl-2-6,dinitroaniline
4-trifluoromethylnicotinic acid
5-(2,4-dichlorophenoxy)-2-nitrobenzoic acid
5-(4-chlorophenyl)-N-(4-oxocyclohexyl)-4-methyl-2-oxothiazolidine-3-carboxamide
5-(aminosulfonyl)-1H-1,2,4-triazole-3-carboxylic acid (ASTCA)
5-[4-(4-hydroxyphenoxy)phenyl-5-methyl-3-(phenylamino)-2,4-oxazolidine dione
5-amino-2,4-dimethyltrifluoromethanesulfonanilide
5-amino-N-(2,6-dichloro-3-methylphenyl)-1H-1,2,4-triazole-3-sulfonamide
5-hydroxy florasulam
5-hydroxy pyrimidine amine
5-methyl-2-(3H)-oxazolone
6-(2-ethylsulfinylpropyl)-4-oxy-2-propyl-4,5,6,7-tetrahydro-1,3,benzoxazole
6-(3-trifluoromethylphenoxy)-2-pyridine carboxylic acid

6-{5-hydroxy-1-methyl-1H-pyrazol-4-yl)carbonyl]-5-methyl-2,3-dihydro-4H-1-benzothiopyran-4-one
6-chloro-3-phenyl-pyridazin-4-ol
6-chloronicotinic acid
6-ethoxy-2-ethyl-4-hydroxypyrimidine
abamectin
acephate
acequinocyl
acetamiprid
acetochlor
acibenzolar-s-methyl
acid sulphonamide
acid sulphonimide
acifluorfen-sodium
aclonifen
acrinathrin
acrolein
alachlor
alanycarb
albendazole
aldicarb
aldicarb sulfoxide
aldoxycarb
aldrin
allethrin
allethrolone
alloxydim
alpha-cypermethrin
alpha-hydroxy-alpha-methyl-4-phenoxybenzene acetic acid
aluminium ammonium sulphate
aluminium sulphate
ametryn
amide
amidosulfuron
aminomethylphosphonic acid (AMPA)
aminopyralid
aminopyrimidine
amitraz
amitrole
ammonium acetate
ammonium carbonate
ammonium hydroxide
ammonium sulphamate
ammonium sulphate
ammonium thiocyanate
ancymidol
anilazine
aniline
anthracene oil
anthraquinone
asulam
atrazine
aviglycine-HCl
azaconazole
azadirachtin
azafenidin
azamethiphos
azimsulfuron
azinphos-ethyl
azinphos-methyl
aziprotryne
azocyclotin
azoxystrobin
Bacillus sphaericus
Bacillus subtilis
Bacillus thuringiensis
beflubutamid
benalaxyl
benalaxyl-M
benazolin
bendiocarb
benfluralin
benfuracarb
benfuresate
benodanil
benomyl
benoxacor
bensulfuron-methyl
bensulide
bensultap
bentazone
benthiavalicarb
benzaldehyde
benzfendizone
benzo[1,2,3]thiadiazole-7-carboxylic acid
benzothiazole
benzothiazolyloxyacetic acid
benzoximate
benzyl alcohol
beta-cyfluthrin
beta-cypermethrin
bifenazate
bifenox
bifenthrin
binapacryl
bioallethrin
bioresmethrin
biphenyl
bispyribac-sodium
bistrifluron
bitertanol
bitertanol-benzoic acid
bone oil
Bordeaux mixture
boscalid
brodifacoum
bromacil
bromadiolone
bromethalin
bromocyclen
bromofenoxim
bromophos
bromophos-ethyl
bromopropylate
bromoxynil
bromuconazole
bronopol
bupirimate
buprofezin
butachlor
butanamide
butocarboxim
butoxycarboxim
butralin
butylate
cadusafos
calciferol

calcium carbonate
calcium chloride
calcium hydroxide
calcium phosphate
camphechlor
captafol
captan
carbaryl
carbendazim
carbetamide
carbofuran
carbon dioxide
carbophenothion
carbosulfan
carboxin
carboxin sulfone
carboxin sulfoxide
carfentrazone-ethyl
carpropamid
cartap
carvone
cetrimide
chinomethionat
chitosan
chlomethoxyfen
chloralose
chloramben
chlorbromuron
chlorbufam
chlordane
chlorethoxyfos
chlorfenapyr
chlorfenson
chlorfenvinphos
chlorfluazuron
chlorflurenol
chloridazon
chlormephos
chlormequat chloride
chlorobenzilate
chlorobenzoxazolone
chloroneb
chlorophacinone
chlorophyllin
chloropicrin
chloropropylate
chlorothalonil
chlorotoluron
chloroxuron
chlorpropham
chlorpyrifos
chlorpyrifos-methyl
chlorsulfuron
chlorthal-dimethyl
chlorthiamid
chlozolinate
cholecalciferol
choline chloride
chrysanthemic acid
cinidon ethyl
cinmethylin
cinosulfuron
cis- 5-(4-chlorophenyl)-dihydro-3-phenyl-3-(1H-1,2,4-triazole-1-ylmethyl)-2- 3H-furanone
clethodim
clethodim sulfoxide
clethodim sulfuron
clodinafop-propargyl
clofencet
clofentezine
clomazone
clopyralid
cloquintocet-mexyl
clothianidin
codlemone
copper acetate
copper carbonate
copper chloride
copper dimethyldithiocarbamate
copper hydroxide
copper oxide
copper oxychloride
copper sulphate
coumachlor
coumafuryl
coumaphos
coumatetralyl
crimidine
cyanamide
cyanazine
cyanophos
cyazofamid
cyclanilide
cycloate
cyclopropylpropane-1,3-dione
cycloxydim
cycloxydim sulfone (T2SO)
cycloxydim sulfoxide (TSO)
cycluron
cyflufenamid
cyfluthrin
cyhalofop acid
cyhalofop amide
cyhalofop diacid
cyhalofop-butyl
cyhalothrin
cyhexatin
cymiazol
cymoxanil
cypermethrin
cyproconazole
cyprodinil
cyromazine
dalapon-sodium
daminozide
dazomet
DCPMU
DCPU
DDT
DE-535 phenol
DE-535 pyridinol
DE-535 pyridinone
decamethrinic acid (Br2CA)
deethyl ametryne (DEA)
deltamethrin
demethoxyisoxaben
demeton-S-methyl
desaminodiketometribuzin (DADK)
desamino-metamitron
desethyl azinphos-ethyl
desethylatrazine

desethylsimazine
desmedipham
desmethyl sulfosulfuron
desmethylisoproturon
desmetryn
di-1-p-menthene
diafenthiuron
di-allate
diazinecarboxylic acid, 2-(4-methoxy-[1,1-biphenyl]-3-yl),1-methylethyl ester
diazinon
dicamba
dichlobenil
dichlofenthion
dichlofluanid
dichloracetic acid
dichlorodiphenyldichloroethane (DDD)
dichlorodiphenyldichloroethylene (DDE)
dichloroethanol
dichlorophen
dichlorprop
dichlorprop-P
dichlorvos
diclofop-methyl
dicloran
dicofol
dicrotophos
dicyclanil
dicyclopentadiene
dieldrin
dienochlor
diethofencarb
diethylenetriaminopentamethyl phosphonic acid (DTPP)
diethylthiophosphate
difenacoum
difenoconazole
difenoxuron
difenzoquat
difethialone
diflovidazin
diflubenzuron
diflufenican
dihydroxyallethrolene
diisobutylamine
diketo-metribuzin (DK)
dimefox
dimefuron
dimepiperate
dimethachlor
dimethenamid
dimethenamid-P
dimethipin
dimethirimol
dimethoate
dimethomorph
dimethyl amino oxoacetic acid (DMOA)
dimethylamine
dimethylaminosulfanilide (DMSA)
dimoxystrobin
diniconazole
dinitramine
dinobuton
dinocap
dinoseb
dinoterb
dioxacarb
diphacinone
diphenamide
diquat dibromide
disulfoton
dithianon
dithiocarbamate
dithiopyr
diuron
DMST
DM-TM
DNOC
dodemorph
dodine
endosulfan
endosulfan sulfate
endothal
endrin
epoxiconazole
EPTC
esfenvalerate
ester sulphonamide
ethaboxam
ethalfluralin
ethane sulfonic acid
ethanedial
ethanesulfonic acid (ESA)
ethanethiol
ethephon
ethiofencarb
ethiofencarb sulfone
ethiofencarb sulfoxide
ethion
ethirimol
ethofumesate
ethoprophos
ethoxyquin
ethoxysulfuron
ethyl 3-hydroxycarbanilate (EHPC)
ethylene bisisothiocyanate pulphide (EBIS)
ethylenethiourea
ethylenethiourea (ETU)
ethyleneurea (EU)
etofenprox
etoxazole
etridiazole
etrimfos
F8426-chloropropionic acid
F8426-cinnamic acid
F8426-propionic acid
famoxadone
fatty acids
fenamidone
fenamiphos
fenamiphos sulfone
fenamiphos sulfoxide
fenarimol
fenazaquin
fenbuconazole
fenbutatin oxide
fenchlorazole
fenclorim

fenfuram
fenhexamid
fenitrothion
fenoprop
fenothiocarb
fenoxaprop
fenoxaprop-ethyl
fenoxaprop-P
fenoxaprop-P-ethyl
fenoxycarb
fenpiclonil
fenpropathrin
fenpropidin
fenpropimorph
fenpyroximate
fenthion
fenthion sulfone
fenthion sulfoxide
fentin acetate
fentin hydroxide
fenuron
fenvalerate
ferbam
fipronil
flamprop
flamprop-M-isopropyl
flazasulfuron
flocoumafen
flonicamid
florasulam
fluazifop
fluazifop-butyl
fluazifop-P
fluazifop-P-butyl
fluazinam
fluazolate
flubenzimine
flucycloxuron
flucythrinate
fludioxonil
flufenacet
flufenoxuron
flufenzin
flumetsulam
flumioxazine
fluometuron
fluopicolide
fluoroacetamide
fluoroglycofen
fluoxastrobin
flupyrsulfuron-methyl
fluquinconazole
flurazole
flurenol
fluridone
flurochloridone
fluroxypyr
flurprimidol
flurtamone
flusilazole
flusulfamide
flutolanil
flutriafol
FOE oxalate
FOE sulphonic acid
folpet
fomesafen
fonofos
foramsulfuron
forchlorfenuron
formaldehyde
formetanate
formothion
fosamine
fosetyl-aluminium
fosthiazate
fuberidazole
furalaxyl
furathiocarb
furfural
gamma-cyhalothrin
gamma-HCH
gibberellins
glufosinate-ammonium
glyphosate
guazatine
halfenprox
halofenozide
haloxyfop-P
HEC-5725-carboxylic acid
HEC-5725-des-chlorophenyl
heptachlor
heptachlor epoxide
heptenophos
hexachlorobenzene
hexachlorophene
hexaconazole
hexaflumuron
hexazinone
hexythiazox
HMCPA
hydramethylnon
hydrogen peroxide
hydroprene
hydroxylated lambda-cyhalothrin XV
hydroxypropazine
hydroxysimazine
hymexazol
icaridin
imazalil
imazamethabenz-methyl
imazamox
imazapyr
imazaquin
imazethapyr
imazosulfuron
imibenconazole
imidacloprid
iminoctadine
indoxacarb
iodofenphos
iodosulfuron-methyl-sodium
ioxynil
iprodione
iprovalicarb
isazofos
isofenphos
isopropalin
isoprothiolane
isoproturon
isoval
isoxaben
isoxaflutole
isoxathion

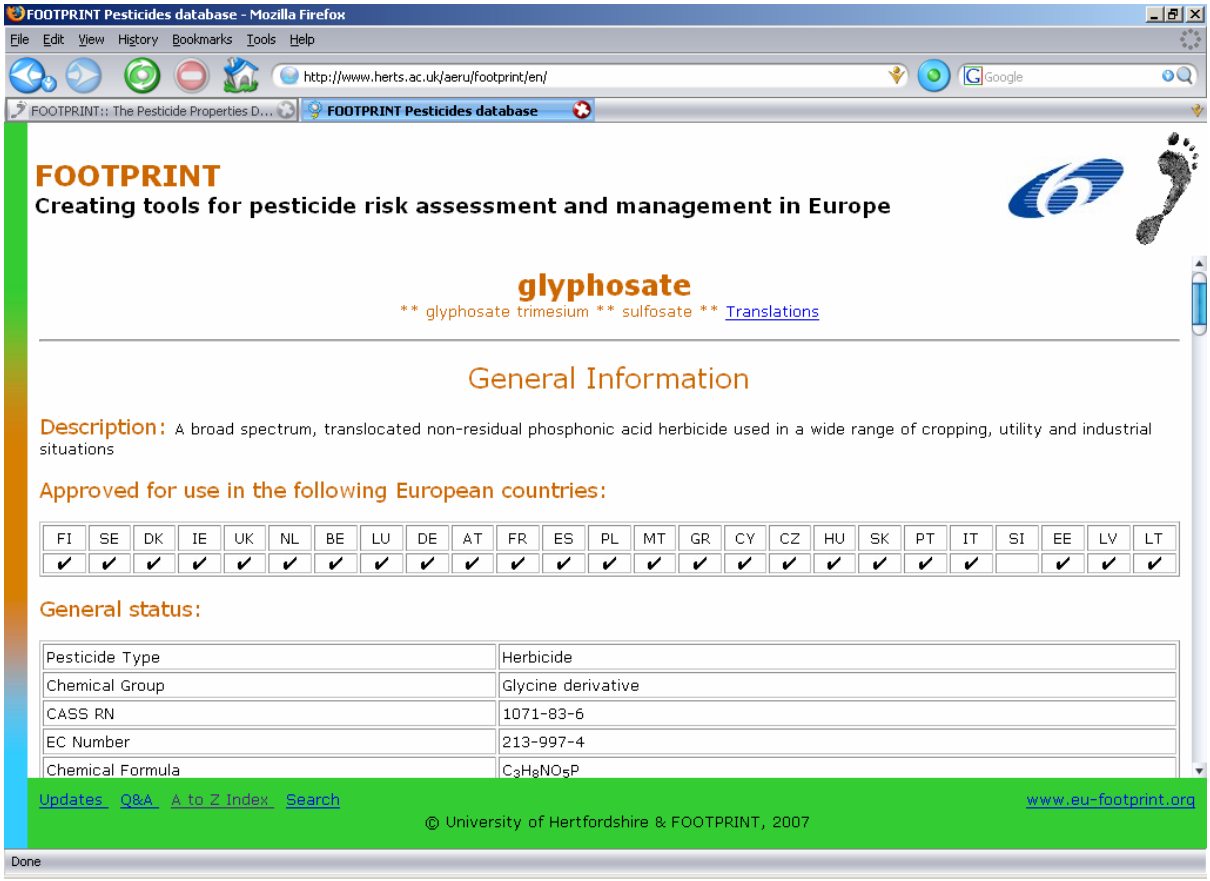
JAU 6476-desthio
JAU 6476-S-methyl
kresoxim-methyl
lambda-cyhalothrin
laminarin
lenacil
limonene
linuron
lufenuron
malathion
malathion dicarboxylic acid
malathion monocarboxylic acid
maleic hydrazide
m-aminophenol
mancopper
mancozeb
mandipropamid
maneb
MCPA
MCPB
mecarbam
mecoprop
mecoprop-P
mefenacet
mefenpyr
mefluidide
melamine
mepanipyrim
mephosfolan
mepiquat chloride
mepronil
meptyldinocap
mercaptan
merphos
mesosulfuron acid
mesosulfuron-methyl
mesotrione
metaflumizone
metalaxyl
metalaxyl-M
metaldehyde
metam
metamitron
metarhizium anisopliae
metazachlor
metazachlor oxalic acid
metazachlor sulfonic acid
metconazole
methabenzthiazuron
methamidophos
methazole
methfuroxam
methidathion
methiocarb
methiocarb methoxy sulfone (M10)
methiocarb sulfone phenol (M05)
methiocarb sulfoxide (M01)
methiocarb sulfoxide phenol (M04)
methomyl
methomyl oxime
methoprene
methoxychlor
methoxyfenozide
methyl bromide
methyl isothiocyanate
methyl-3-hydroxylphenylcarbamate (MHPC)
methyl-7-chloro-2,5-dihydro-2-[[[trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,3,4]oxadi azine-4a(3H)-carboxylate
methylcyclohexylamine
methylcyclohexylurea
methylisothiocyanate
methylsulfonyl-2-nitrobenzoic acid (MNBA)
metiram
metobromuron
metolachlor
metosulam
metoxuron
metrafenone
metribuzin
metsulfuron-methyl
mevinphos
milbemectin
milbemycin A3
milbemycin A4
molinate
molinate sulfoxide
monalide
monolinuron
monuron
MPA
MPP
muscalure
myclobutanil
N-(1,1-dimethylacetonyl)-3,5-dichlorobenzamide
N-(2,6-difluorophenyl)-5-aminosulfonyl-1H-1,2,4-triazole-3-carboxylic acid (DFP-ASTCA)
N-(2,6-dimethylphenyl)-N-(methoxyacetyl)alanine
N-(3,5-dichlorophenyl)3-isopropyl-2,4-dioxoimidazoline-1-carboxamide
N-(3-hydroxyphenol)-N-N-dimethylformamidine
N-(4-trifluoromethylnicotinoyl)glycine
N-(4,6-dimethoxy-2-pyrimidinyl)-N-[3-(ethylsulfonyl)-2-pyridinyl)urea
N-[3-(ethylsulfonyl)-2-pyridinyl]-4,6-dimethyoxy-2-pyrimidinamine
nabam
naled
napropamide
naptalam
N-demethyl phenol
N-demethyl triazine amine
neburon
nicosulfuron
nicotine

N-methyl triazine amine
N-methyl-N-formyl pirimicarb
norflurazon
novaluron
N-phenylcarbamic acid
nuarimol
octhilinone
O-demethyl triasulfuron
O-desmethyl triasulfuron
O-desmethylthifensulfuron methyl
ofurace
olein
omethoate
orbencarb
oryzalin
oxadiargyl
oxadiazon
oxadixyl
oxadixyl acid
oxalamide (M23)
oxamyl
oxamyl oxyme
oxanilic acid
oxasulfuron
oxycarboxin
oxychlordane
oxydemeton-methyl
oxyfluorfen
oxytetracycline
paclobutrazol
paraquat
parathion
parathion-methyl
p-chlorobenzylamine
pebulate
penconazole
pencycuron
pendimethalin
penoxsulam
pentachloroaniline
pentachlorobenzene
pentachlorophenol
pentanochlor
permethrin
pethoxamid
phenmedipham
phenothrin
phenthoate
phenyl sulfonamide
phenylurea
phorate
phosalone
phosmet
phosphamidon
phosphine
phoxim
phthalamic acid
phthalic acid
phthalimide
picloram
picolinafen
picoxystrobin
pinoxaden
piperonyl butoxide
pirimicarb
pirimicarb phenol
pirimiphos-ethyl
pirimiphos-methyl
p-methyl-phenethylamine (PMPA)
polyoxin
pretilachlor
primisulfuron
prochloraz
procymidone
profenofos
profoxydim
prohexadione-calcium
promecarb
prometon
prometryn
propachlor
propamocarb hydrochloride
propanil
propaquizafop
propargite
propazine
propetamphos
propham
propiconazole
propineb
propoxur
propoxycarbazone-sodium
propylene urea (PU)
propyzamide
proquinazid
prosulfocarb
prosulfuron
prothioconazole
prothiofos
prothiofos-oxon
prothoate
pymetrozine
pyraclofos
pyraclostrobin
pyraflufen-ethyl
pyrazophos
pyrazoxyfen
pyrethrins
pyridaben
pyridafenthion
pyridate
pyrifenox
pyrimethanil
pyrimidine amine
pyriproxyfen
pyrithiobac-sodium
pyroquilone
quinalphos
quinclorac
quinmerac
quinoclamine
quinoxyfen
quintozene
quizalofop-ethyl
quizalofop-P-ethyl
quizalofop-P-tefuryl
resmethrin
rimsulfuron
rotenone
saccharin
scilliroside
sethoxydim
sethoxydim-sulfoxide

siduron
silthiofam
simazine
sintofen
S-metolachlor
sodium carbonate
sodium chloride
spinosad
spirodiclofen
spiromesifen
spiroxamine
sulcotrione
sulfentrazone
sulfide
sulfluramid
sulfonamide methyl ester
sulfonate (M27)
sulfone
sulfonmethylbenzamid
sulfosulfuron
sulfotep
sulphanilamide
sulphonamide
sulphur
sulphuric acid
sulprofos
sulprofos sulfone
sulprofos sulfoxide
tau-fluvalinate
TCA-Sodium
tebuconazole
tebufenozide
tebufenpyrad
tebutam
tebuthiuron
tecnazene
teflubenzuron
tefluthrin
temephos
tepraloxydim
terbacil
terbufos
terbumeton
terbuthylazine
terbutryn
tetrachlorvinphos
tetraconazole
tetradifon
tetrahydrophthalamic acid
tetrahydrophthalimide
tetramethrin
thiabendazole
thiacloprid
thiamethoxam
thiazafluron
thiazopyr
thidiazuron
thifensulfuron acid
thifensulfuron-methyl
thiobencarb
thiodicarb
thiofanox
thiofanox sulfone
thiofanox sulfoxide
thiometon
thiometon sulfone
thiometon sulfoxide
thiophanate-methyl
thiophene sulfonamide
thiourea
thiram
tiocarbazil
TKC-94 sulfonic acid
tolclofos-methyl
tolylfluanid
topramezone
tralkoxydim
tralomethrin
trans-5-(4-chlorophenyl)-4-methyl-2-oxothiazolidine
trans-5-(4-chlorophenyl)-4-methyl-2-oxothiazolidine-3-carboximide
trans-5-(4-chlorophenyl)-dihydro-3-phenyl-3- (1H-1,2,4-triazole-1-ylmethyl)-2-3H-furanone
triadimefon
triadimenol
tri-allate
triasulfuron
triazamate
triazine amine
triazolyacetic acid (TAA)
triazophos
triazoxide
tribenuron-methyl
tribufos
trichloracetaldehyde
trichloracetic acid
trichlorfon
trichloroacetic acid
trichloronate
trichloropyridinol
triclopyr
tricyclazole
tridemorph
tridiphane
trietazine
trifloxystrobin
triflumizole
triflumuron
trifluoroethanoic acid
trifluoromethyl benzoic acid
trifluralin
triflusulfuron-methyl
triforine
trimedlure
trimethacarb
trinexapac-acid
trinexapac-ethyl
triticonazole
tritosulfuron
uniconazole
urea
validamycin
vamidothion
vernolate
vinclozolin
warfarin
zeta-cypermethrin
zineb
ziram
zoxamide
M14360-acid

NOA 447204
NOA 407854
CL 354825
AE F161778
149-F11
M14360-alcohol
BAS 500-7
RH-24549
149-F
FA-1-1
BAS 500-6
IN-R9419
RPA 412708
RH-127450
RPA 413255
RH-163353
RPA 407922
RPA 412636
IN-MM671
RP 025496
CGA118245
IN-JV460
IN-KY374
IN-KV996
AE F126663
RH-5781
RP-017272
AE F136086

Appendix 2 - Screenshots of the FOOTPRINT PPDB for glyphosate



FOOTPRINT Pesticides database - Mozilla Firefox

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http://www.herts.ac.uk/aeru/footprint/en/

FOOTPRINT:: The Pesticide Properties D... | FOOTPRINT Pesticides database

FOOTPRINT

Creating tools for pesticide risk assessment and management in Europe

glyphosate

** glyphosate trimesium ** sulfosate ** Translations

General Information

Description: A broad spectrum, translocated non-residual phosphonic acid herbicide used in a wide range of cropping, utility and industrial situations

Approved for use in the following European countries:

FI	SE	DK	IE	UK	NL	BE	LU	DE	AT	FR	ES	PL	MT	GR	CY	CZ	HU	SK	PT	IT	SI	EE	LV	LT
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔

General status:

Pesticide Type	Herbicide
Chemical Group	Glycine derivative
CASS RN	1071-83-6
EC Number	213-997-4
Chemical Formula	$C_3H_8NO_5P$

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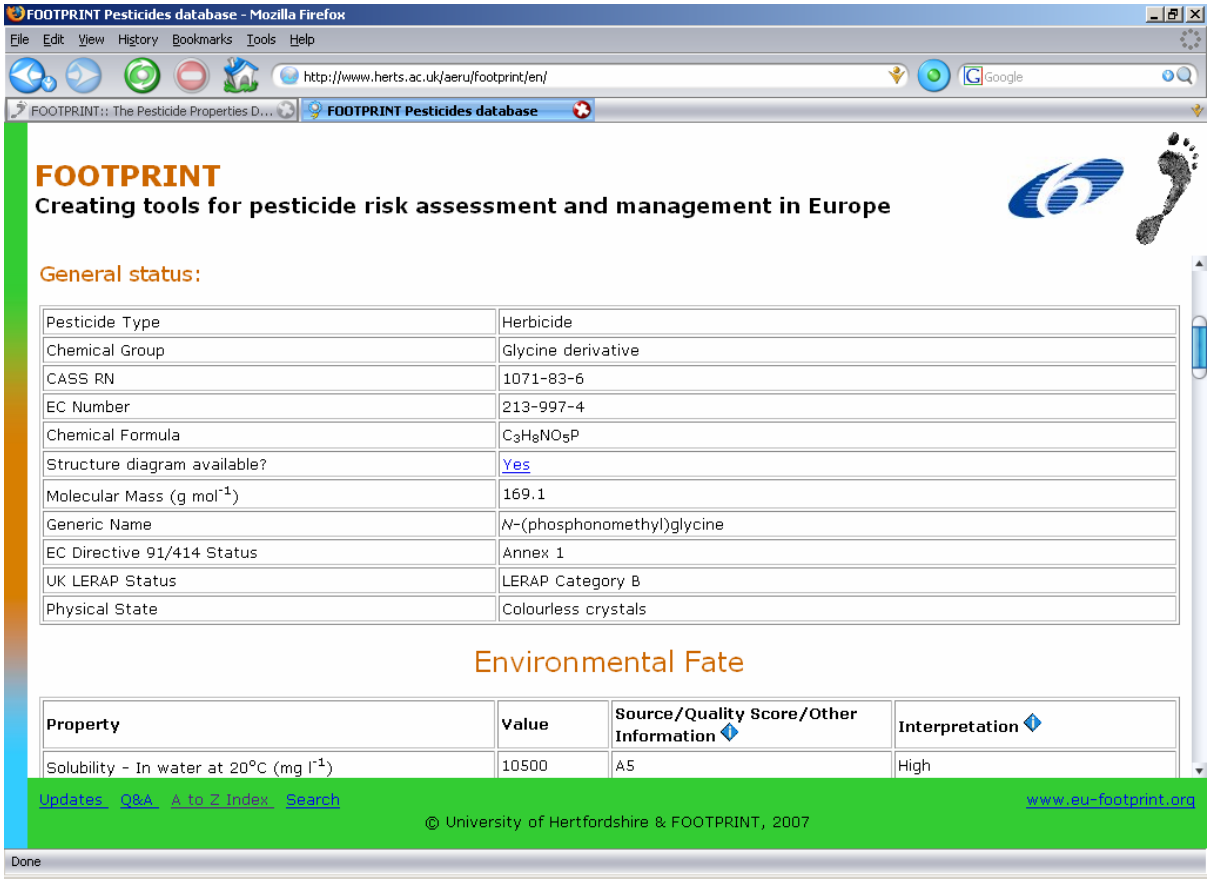
Done



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http://www.herts.ac.uk/aeru/footprint/en/

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Creating tools for pesticide risk assessment and management in Europe

General status:

Pesticide Type	Herbicide
Chemical Group	Glycine derivative
CASS RN	1071-83-6
EC Number	213-997-4
Chemical Formula	$C_3H_8NO_5P$
Structure diagram available?	Yes
Molecular Mass (g mol^{-1})	169.1
Generic Name	N-(phosphonomethyl)glycine
EC Directive 91/414 Status	Annex 1
UK LERAP Status	LERAP Category B
Physical State	Colourless crystals

Environmental Fate

Property	Value	Source/Quality Score/Other Information	Interpretation
Solubility - In water at 20°C (mg l^{-1})	10500	A5	High

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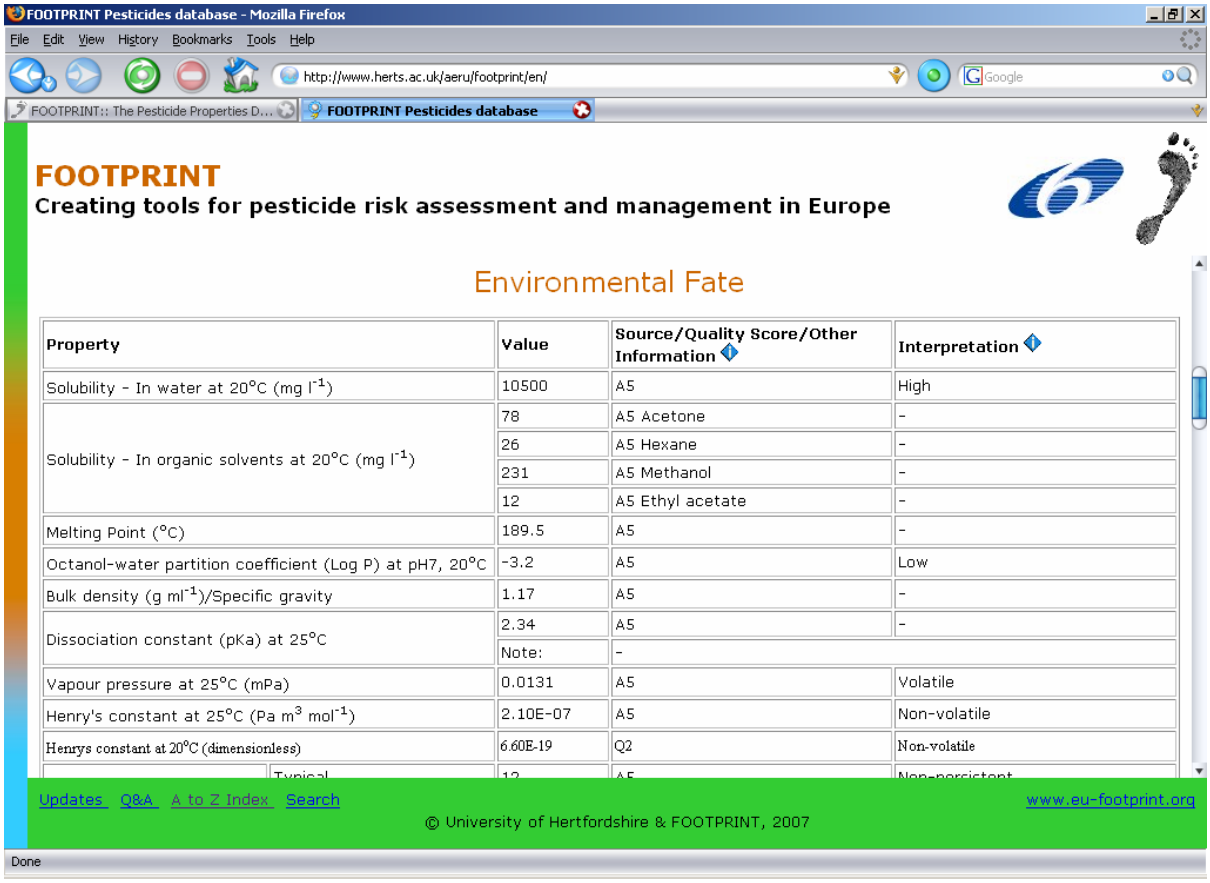
Done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Environmental Fate
Property
Value
Source/Quality Score/Other Information
Interpretation
Solubility - In water at 20°C (mg l-1)
10500
A5
High
Solubility - In organic solvents at 20°C (mg l-1)
78
A5 Acetone
-
26
A5 Hexane
-
231
A5 Methanol
-
12
A5 Ethyl acetate
-
Melting Point (°C)
189.5
A5
-
Octanol-water partition coefficient (Log P) at pH7, 20°C
-3.2
A5
Low
Bulk density (g ml-1)/Specific gravity
1.17
A5
-
Dissociation constant (pKa) at 25°C
2.34
A5
-
Note:
-
Vapour pressure at 25°C (mPa)
0.0131
A5
Volatile
Henry's constant at 25°C (Pa m3 mol-1)
2.10E-07
A5
Non-volatile
Henrys constant at 20°C (dimensionless)
6.60E-19
Q2
Non-volatile
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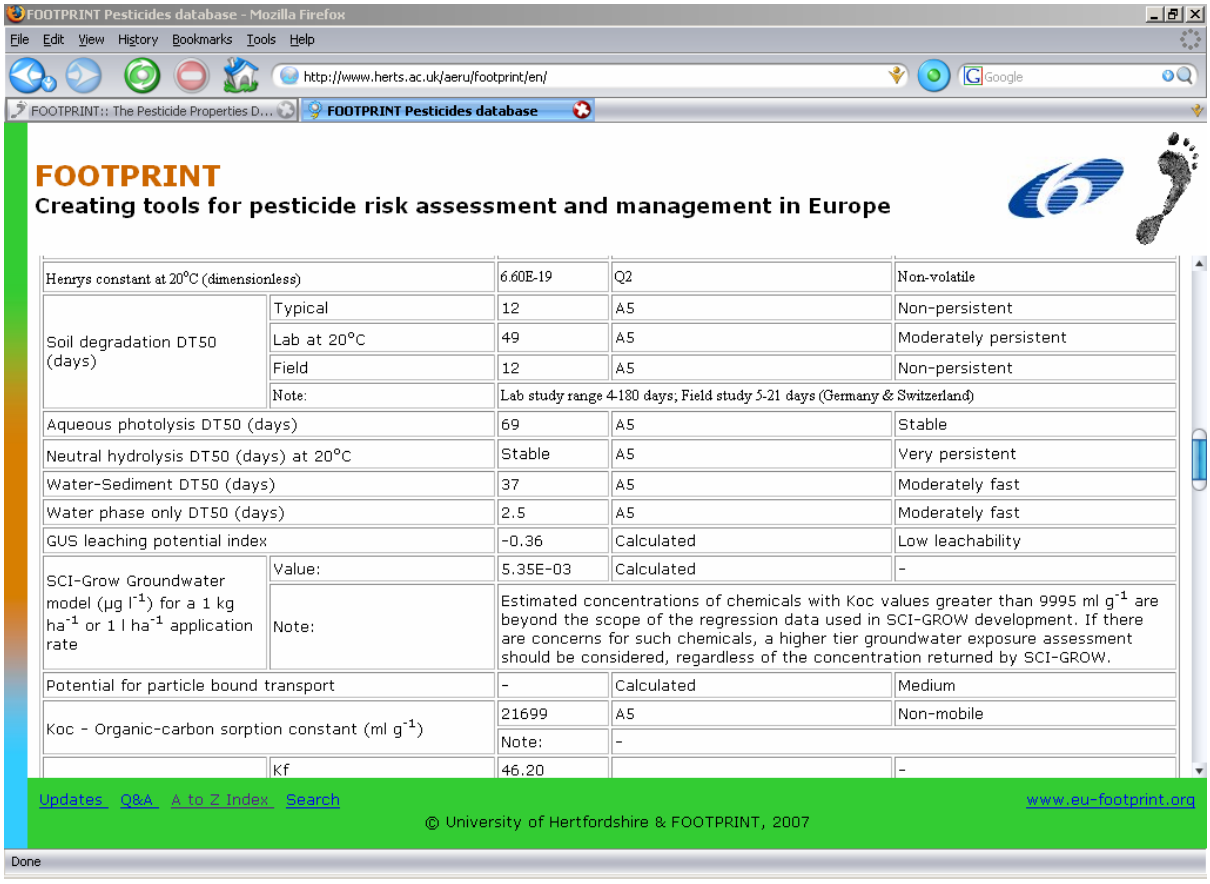
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Henrys constant at 20°C (dimensionless)
6.60E-19
Q2
Non-volatile
Soil degradation DT50 (days)
Typical
12
A5
Non-persistent
Lab at 20°C
49
A5
Moderately persistent
Field
12
A5
Non-persistent
Note:
Lab study range 4-180 days; Field study 5-21 days (Germany & Switzerland)
Aqueous photolysis DT50 (days)
69
A5
Stable
Neutral hydrolysis DT50 (days) at 20°C
Stable
A5
Very persistent
Water-Sediment DT50 (days)
37
A5
Moderately fast
Water phase only DT50 (days)
2.5
A5
Moderately fast
GUS leaching potential index
-0.36
Calculated
Low leachability
SCI-Grow Groundwater model (µg l-1) for a 1 kg ha-1 or 1 l ha-1 application rate
Value:
5.35E-03
Calculated
-
Note:
Estimated concentrations of chemicals with Koc values greater than 9995 ml g-1 are beyond the scope of the regression data used in SCI-GROW development. If there are concerns for such chemicals, a higher tier groundwater exposure assessment should be considered, regardless of the concentration returned by SCI-GROW.
Potential for particle bound transport
-
Calculated
Medium
Koc - Organic-carbon sorption constant (ml g-1)
21699
A5
Non-mobile
Note:
-
Kf
46.20
-
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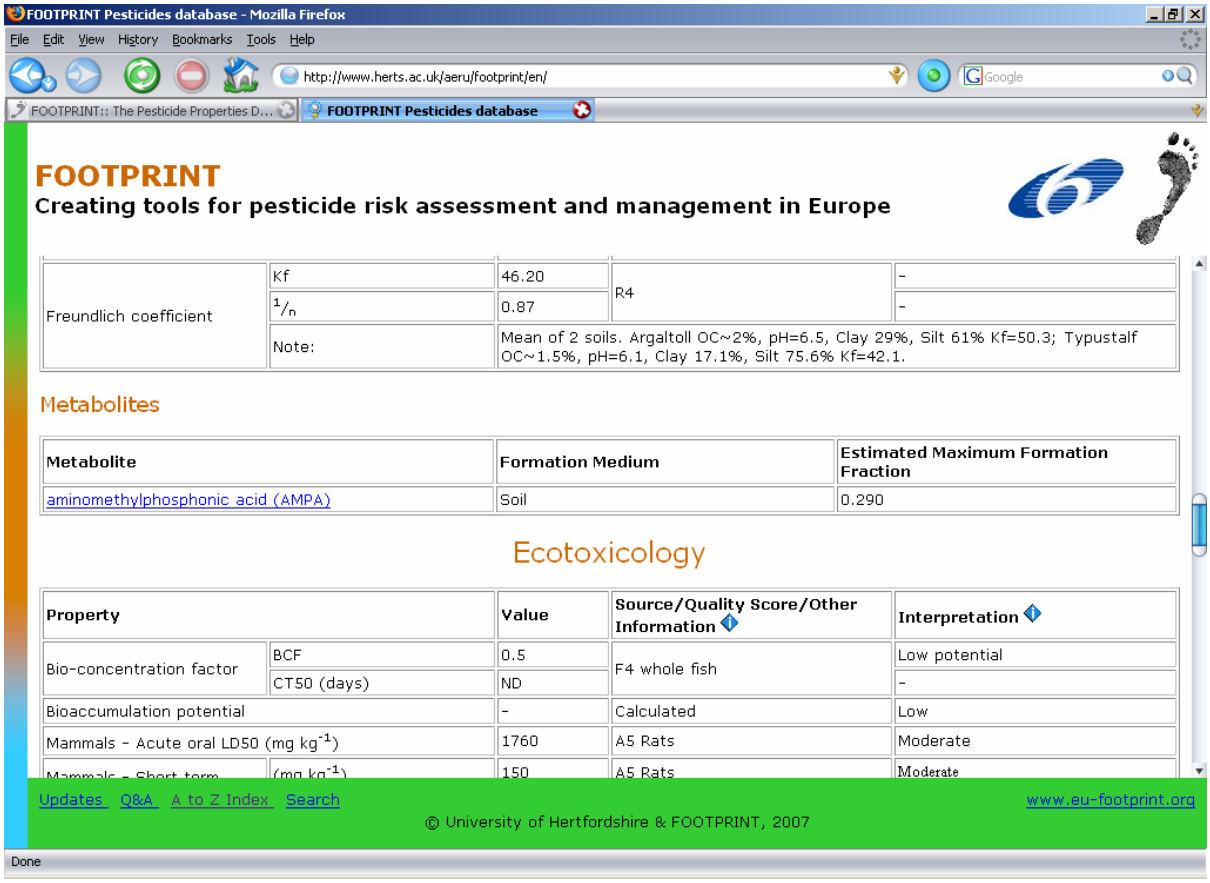

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Freundlich coefficient	Kf	46.20	R4	-
	$^1/_n$	0.87		-
	Note:	Mean of 2 soils. Argaltoll OC~2%, pH=6.5, Clay 29%, Silt 61% Kf=50.3; Typustalf OC~1.5%, pH=6.1, Clay 17.1%, Silt 75.6% Kf=42.1.		

Metabolites

Metabolite	Formation Medium	Estimated Maximum Formation Fraction
aminomethylphosphonic acid (AMPA)	Soil	0.290

Ecotoxicology

Property		Value	Source/Quality Score/Other Information	Interpretation
Bio-concentration factor	BCF	0.5	F4 whole fish	Low potential
	CT50 (days)	ND		-
Bioaccumulation potential		-	Calculated	Low
Mammals - Acute oral LD50 (mg kg^{-1})		1760	A5 Rats	Moderate
Mammals - Short term	(mg kg^{-1})	150	A5 Rats	Moderate

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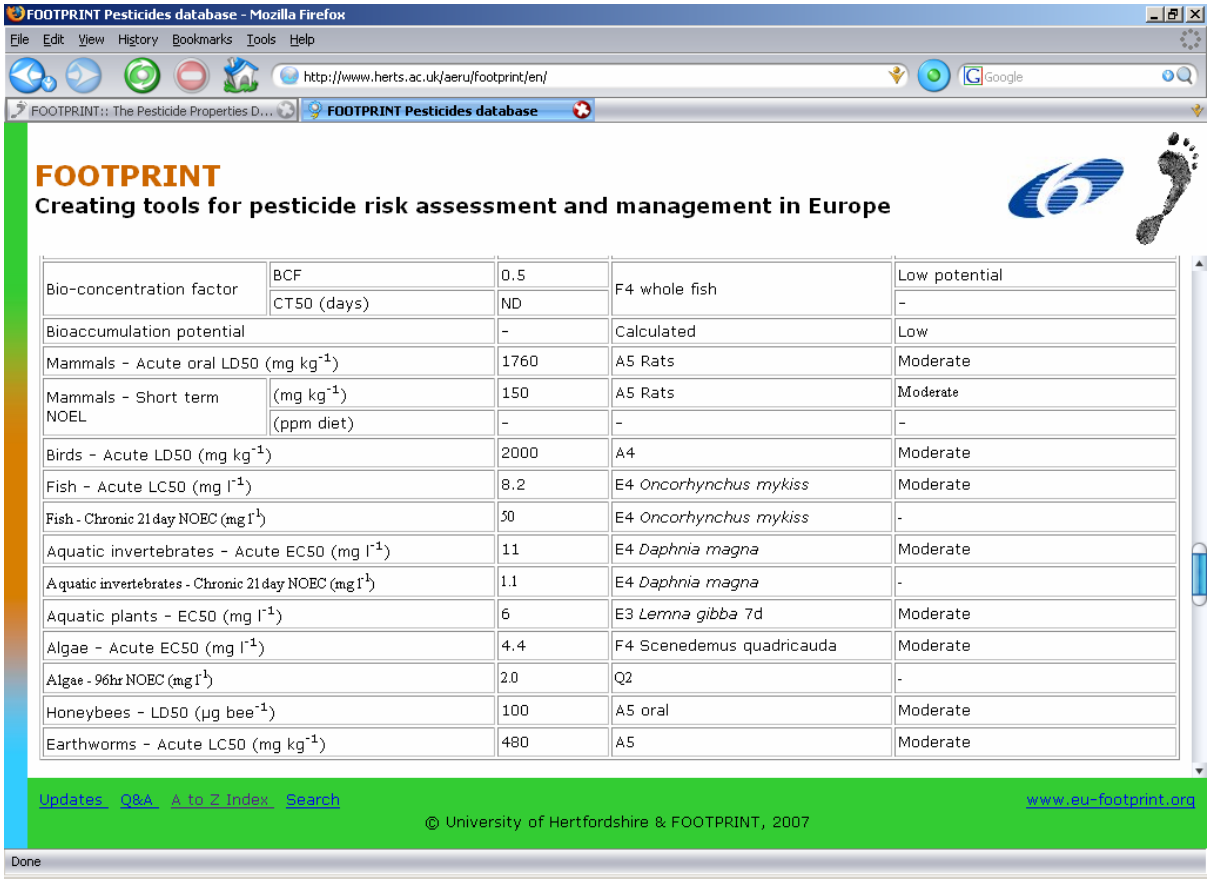

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Bio-concentration factor	BCF	0.5	F4 whole fish	Low potential
	CT50 (days)	ND		-
Bioaccumulation potential		-	Calculated	Low
Mammals - Acute oral LD50 (mg kg^{-1})		1760	A5 Rats	Moderate
Mammals - Short term	(mg kg^{-1})	150	A5 Rats	Moderate
NOEL	(ppm diet)	-	-	-
Birds - Acute LD50 (mg kg^{-1})		2000	A4	Moderate
Fish - Acute LC50 (mg l^{-1})		8.2	E4 *Oncorhynchus mykiss*	Moderate
Fish - Chronic 21 day NOEC (mg l^{-1})		50	E4 *Oncorhynchus mykiss*	-
Aquatic invertebrates - Acute EC50 (mg l^{-1})		11	E4 *Daphnia magna*	Moderate
Aquatic invertebrates - Chronic 21 day NOEC (mg l^{-1})		1.1	E4 *Daphnia magna*	-
Aquatic plants - EC50 (mg l^{-1})		6	E3 *Lemna gibba* 7d	Moderate
Algae - Acute EC50 (mg l^{-1})		4.4	F4 Scenedemus quadricauda	Moderate
Algae - 96hr NOEC (mg l^{-1})		2.0	Q2	-
Honeybees - LD50 (µg bee^{-1})		100	A5 oral	Moderate
Earthworms - Acute LC50 (mg kg^{-1})		480	A5	Moderate

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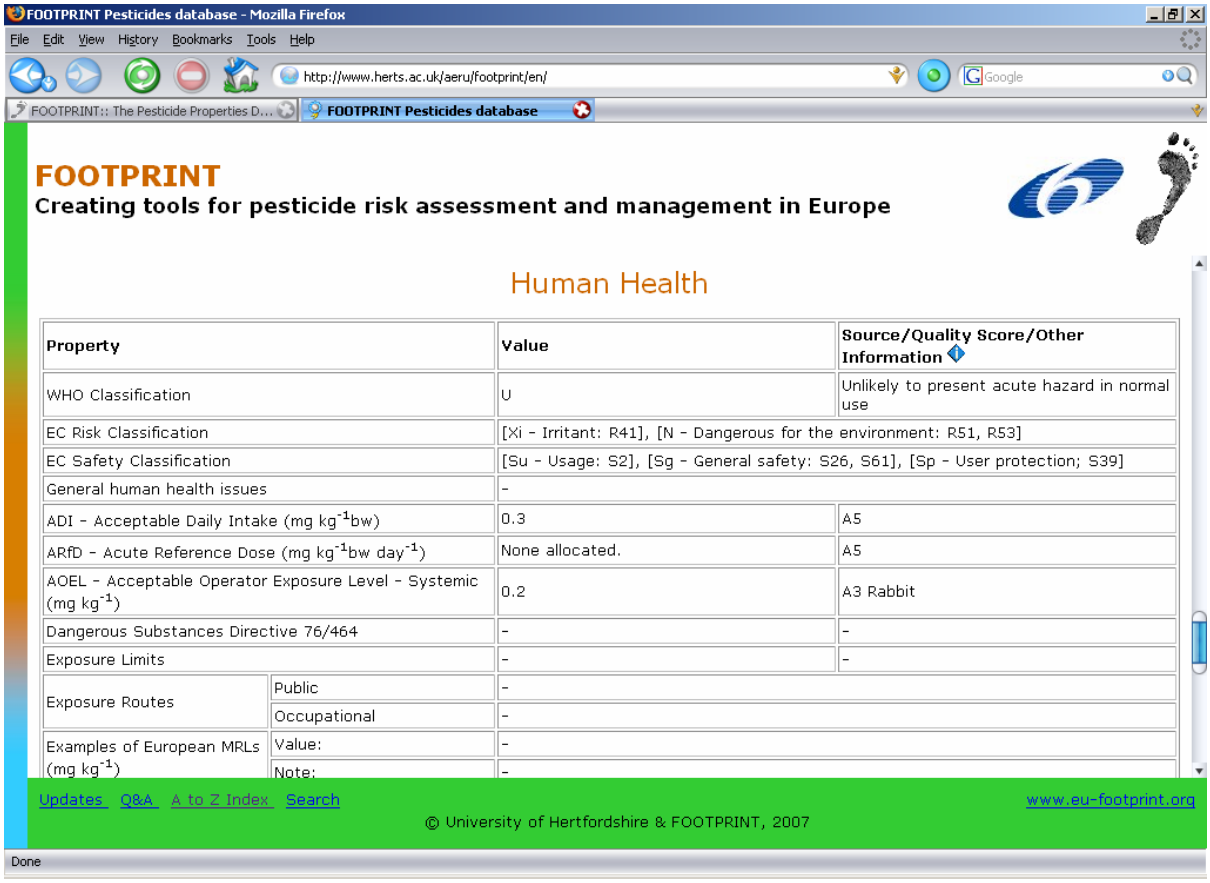

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Human Health

Property		Value	Source/Quality Score/Other Information
WHO Classification		U	Unlikely to present acute hazard in normal use
EC Risk Classification		[Xi - Irritant: R41], [N - Dangerous for the environment: R51, R53]	
EC Safety Classification		[Su - Usage: S2], [Sg - General safety: S26, S61], [Sp - User protection; S39]	
General human health issues		-	
ADI - Acceptable Daily Intake (mg kg^{-1}bw)		0.3	A5
ARfD - Acute Reference Dose (mg kg^{-1}bw day^{-1})		None allocated.	A5
AOEL - Acceptable Operator Exposure Level - Systemic (mg kg^{-1})		0.2	A3 Rabbit
Dangerous Substances Directive 76/464		-	-
Exposure Limits		-	-
Exposure Routes	Public	-	
	Occupational	-	
Examples of European MRLs (mg kg^{-1})	Value:	-	
	Note:	-	

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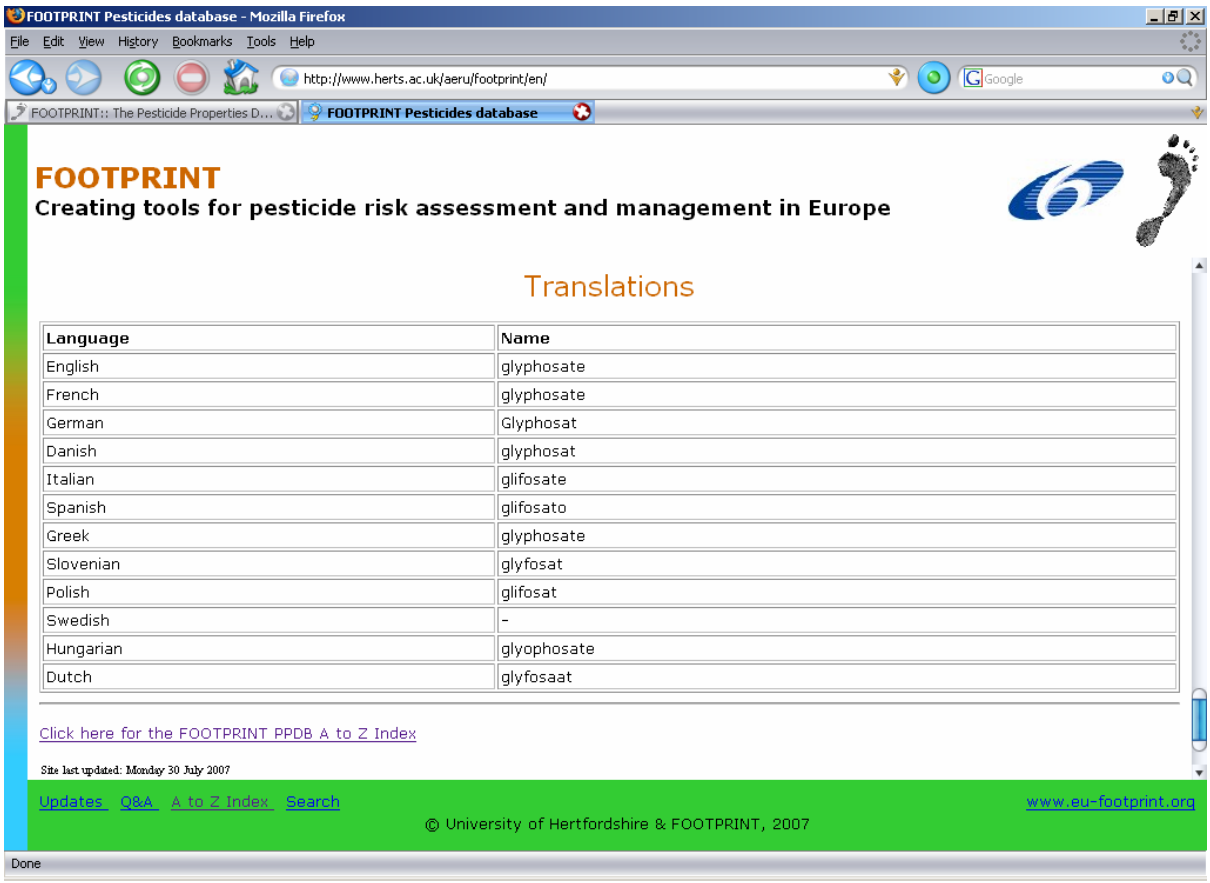

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Translations

Language	Name
English	glyphosate
French	glyphosate
German	Glyphosat
Danish	glyphosat
Italian	glifosate
Spanish	glifosato
Greek	glyphosate
Slovenian	glyfosat
Polish	glifosat
Swedish	-
Hungarian	glyophosate
Dutch	glyfosaat

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