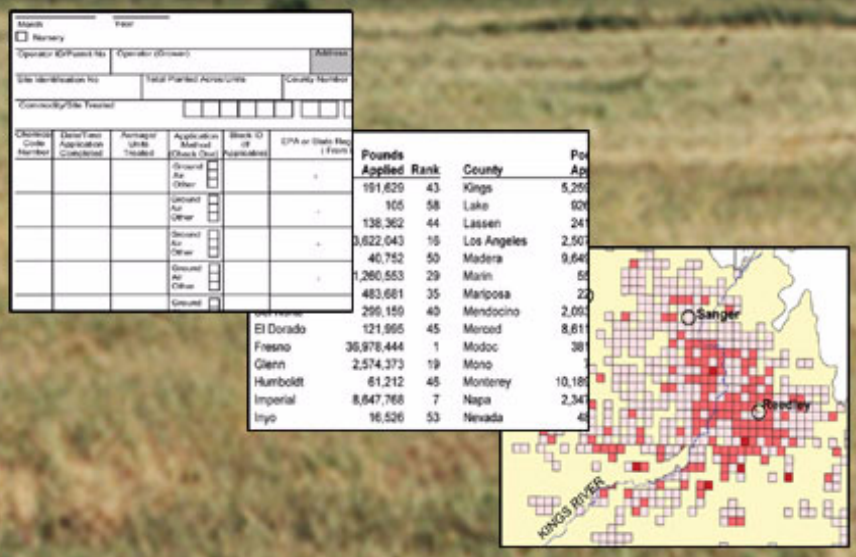
PAN Germany

Pesticide Use Reporting

Options and Possibilities for Europe



Hamburg, 2003

Pesticide Action Network

Founded in 1982, Pesticide Action Network is an international coalition of over 400 citizen groups in more than 60 countries working to oppose the misuse of pesticides and to promote sustainable agriculture and ecologically sound pest management.

PAN Germany was founded in 1984 and strives to reduce impacts of pesticide use on national, european and international level.

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1 Preface

One group of chemicals that requires particular attention is pesticides. (...) They can affect human health via their contamination of groundwaters, soils, food and even the air. Gaps in the current data on the issue make it difficult to be precise about the scale and trends of the problem but there is sufficient evidence to suggest it is serious and growing.[1]

Pesticides are the only group of toxic chemicals intentionally released to the environment. They not only harm living target organisms, but often remain as residues in soil, water and food. Considering that the human population and the environment are exposed to toxic chemicals in their daily life, it is astonishing that detailed information on the use and the distribution of pesticides in the highly industrialised and bureaucratic European agriculture are not available.

Already in 1993, the Fifth Environmental Action Programme (5th EAP) of the European Community required a significant pesticide use reduction per unit land under production. Two other required actions in the 5th EAP were the registration and control of sales and use of pesticides.[2] Apparently, the requirements were not accomplished, the Sixth Environmental Action Programme (6th EAP), adopted 9 years later, observes that there is evidence that the pesticide issue is serious and growing. Actions regarding pesticides include *better* control of the use and distribution of pesticides.

Objective of the 6th EAP concerning pesticides is "*to achieve a situation where the use and levels of pesticides in our environment do not give rise to significant risks to, or impacts on, human health and nature. This will include an overall reduction in the risk associated with the use of pesticides.*"

Pesticide use data are the basic condition to locate and evaluate risk potentials — and actually to prevent risks. Instead of just observing the serious and growing pesticide problem, the European Community must look at the source of pollution and act. Pesticide use reporting systems provide valuable data urgently needed to reduce risks associated with pesticide use. Specific pesticide use data combined with information about environmental conditions and toxicological, chemical and physical properties of the applied ingredients are essential to address the pesticide problem. Without such detailed use data, assessments of pesticide use as well as the evaluations of any programmes targeting risk reduction are basically best-guess assumptions.

The Community Thematic Strategy on the sustainable use of pesticides as suggested by the 6th EAP must lead to a pesticide use reporting system legally required by a Council Directive.

This study present options and possibilties for pesticide use reporting system in the European Union and aims to set the initial in a process towards such a system.

1 European Commission (2002): Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions On the sixth environment action programme of the European Community' Environment 2010: Our future, Our choice' - The Sixth Environment Action Programme - Proposal for a Decision of the European Parliament and of the Council laying down the Community Environment Action Programme 2001-2010

2 European Commission (1993): Towards Sustainability, A European Community programme of policy and action in relation to the environment and sustainable development, (Fifth Environment Action Programme) in Official Journal of the European Communities, No C138/5

2 Introduction

The reporting of pesticide use by the applicator to a governmental organisation, and the public availability of this reported data is very valuable. The PAN Germany study “Pesticide Use Reporting - Legal Framework, Data Processing and Utilisation” [3] which analysed existing pesticide use reporting (PUR) systems illustrates that pesticide use data have been utilised for a great variety of purposes. Pesticide use data are utilised for the analysis of trends and statistics by crop, region, ingredient and product. They are also used for the protection of ground and surface water, for risk assessment, for epidemiological studies and for the evaluation of pest management practices.

This study looks at options and possibilities how pesticide use can be reported in the European Union. It focuses on agricultural pesticide uses on farms, orchards, vine yards, nurseries, and tree nurseries. However, many of the procedures, needs and steps described here can also be applied to a reporting system for other uses of products containing pesticide active ingredients.

Agriculture in Europe varies widely. There are approximately 3.9 million farms with an acreage under 5 hectare, some of them are family farms with low technical input, some of them maintain orchards with pesticide intense speciality crops, but there are also big agricultural cooperations which practise satellite controlled precision farming.

This study does not present one PUR model for the entire European Union. It does discuss different options and possibilities to create a PUR system which can be adjusted by individual Member States, but which is still uniform within the EU. Within a specific framework, each Member State must create its own PUR system adapted to the individual technical development and the existing resources. This study outlines steps which seem helpful to create a PUR system.

Goal of pesticide use reporting systems is to protect human health and the environment. PUR systems are a basis for the development of pesticide risk reduction programme and their evaluation.

To ensure compliance with regulations requiring pesticide use reporting, and to ensure reliable reporting, little burden has to be put on the farmer who report their pesticide use. Pesticide use reporting data should not be used to pursue illegal uses with lawsuits. If illegal use is reported by the applicator awareness must be raised and alternatives discussed.

The study shortly presents an overview of the results of the first phase of the project on existing PUR systems and then looks at agriculture and pesticide use in the EU. An overview of farmers access to computer and the internet is given and different options of PUR systems and steps towards the implementation are discussed.

3 Neumeister, L. (2002): Pesticide Use Reporting - Legal Framework, Data Processing and Utilisation, Part One Full Reporting Systems in California and Oregon, Pesticide Action Network Germany, Hamburg, Germany

3 Overview of Existing PUR Systems

In a first phase the PAN Germany project entitled “Development of Pesticide Use Reporting Systems in the European Union” looked at PUR systems in California, Oregon, New York, Arizona and the United Kingdom.[4] From this analysis four types of PUR systems derive:

1. reporting of applications with commercial intention,
2. reporting of applications of specific pesticides,
3. reporting of applications conducted by certain applicators,
4. reporting of a specific type of application.

These four types are not necessarily applied individually. In Arizona, all agricultural custom applicators, who apply pesticides for hire must report these applications. All uses of pesticides under Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), all agricultural soil applications of pesticide listed on the Arizona Groundwater Protection List and all agricultural aerial applications have to be reported as well. In California and Oregon all pesticide applications with commercial intention have to be reported, this includes non-agricultural uses.[5] In the United Kingdom, only aerial applications must be reported. In New York State, all commercial applicators (pest control companies and custom applicators) are required to report their agricultural and non-agricultural applications.

The existing PUR systems also have different requirements regarding which information is reported in which timespan. In addition to use reporting, user surveys and retail sales reporting systems are carried out to gather further information on pesticide use. Private uses of pesticides or biocides in homes and gardens are neglected by all existing PUR systems. Oregon plans to fill this gap with user surveys.

4 Neumeister, L., Baier, A. (2001): Development of a Pesticide Use Reporting System in the European Union, Interim Report, Analysis of Existing Pesticide Use Reporting Systems, (internal report, not published) Pesticide Action Network Germany, Hamburg, Germany

5 Full report see footnote 3.

4 Agriculture in the European Union

The agricultural area in the current 15 Member States of the European Union comprises over 130 million hectare. Almost 7 million farmholdings exist. The number of farmholdings is continuously decreasing. In some countries the number of farms decreased by over 50% between 1975 and 1997. In only two years, between 1995 and 1997, the number of farms decreased by 381.000 holdings or 5,2% in the 15 EU Member States. There are several reasons for the decreasing number of farms such as migration away from rural areas, industrialisation, competition, change in land use, retirement of farmers and incentives to stop farming.[6]

Over 22 million farmholdings exist in the Eastern European countries which are EU enlargement candidates. In these countries the agricultural land comprises almost 60 million hectare. The utilised agricultural land and the number of farmholdings by country is shown in Table 1.

Table 1: Utilised Agricultural Area and Number of Holdings in the EU and Ten Enlargement Candidates

	Utilized Agricultural Area (1.000 ha) *Year 2000*	*Number of Holdings (1.000)* *Year 1997*
EU-15	**130.443**	**6.989**
Belgium	1.396	67
Denmark	2.666	63
Germany	17.067	534
Greece	3.901	821
Spain	25.425	1.208
France	29.865	680
Ireland	4.418 (1)	148
Italy	15.401 (1)	2.315
Luxembourg	135	3
Netherlands	1.976	108
Austria	3.399	210
Portugal	3.881	417
Finland	2.211	91
Sweden	2.980	90
United Kingdom	15.722	233
Eastern European Enlargement Candidates	**58.662**	**> 22.110**
Bulgaria	5.582	1.777 (2)
Czech Republic	4.282	3.850
Estonia	1.001 (1)	551
Hungary	5.854	3.740
Latvia	2.488	n.a.
Lithuania	3.489	n.a.

6 Europäische Kommission, EUROSTAT, Spezialisierung der Betriebe und intensivere Verfahren (http://europa.eu.int/comm/agriculture/envir/report/de/expl_de/report.htm) and European Commission, (2002): Agriculture in the European Union, Statistical and economic information 2001, Brussels, Belgium

Table 1: (continued) Utilised Agricultural Area and Number of Holdings in the EU and Ten Enlargement Candidates		
	Utilized Agricultural Area (1.000 ha) *Year 2000*	*Number of Holdings (1.000)* *Year 1997*
Poland	18.220	2.264
Romania	14.811	7.656
Slovakia	2.444	1.577
Slovenia	491 (1)	695

(1) 1999 data
(2) 1996 data
Sources: European Commission, FAO

Table 2 shows that 56% of the farms in the current 15 EU Member States are smaller than 5 hectares, and that almost 80% of the farms are smaller than 20 hectares. Such detailed data are only available for few Eastern European countries which are enlargement candidates.[7] In Bulgaria, 1.535.223 (86,4%) of the 1.777.122 farms are smaller than 1 hectare. The 3.506 (0,2%) farms, which are larger than 10 hectares, cultivate 66,7% of the utilised agricultural land in Bulgaria.[8]

Table 2: Number of Farmholdings (1.000) by size in the Year 1997				
Country	< 5 ha	5 - 20 ha	20 - 50 ha	> 50 ha
EU-15	3.901,7	1.686,9	802,0	372,2
Belgium	21,6	21,0	17,8	5,6
Denmark	2,2	23,8	19,6	12,0
Germany	168,1	168,2	122,4	53,3
Greece	626,8	169,9	21,6	2,7
Spain	647,1	347,1	115,3	51,5
France	182,4	136,8	158,9	125,7
Ireland	11,1	58,5	57,4	16,6
Italy	1.753,6	424,1	96,0	27,4
Luxembourg	0,7	0,5	0,6	0,9
Netherlands	34,5	36,5	29,2	6,6
Austria	79,6	86,2	35,8	5,7
Portugal	317,1	75,2	14,8	4,2
Finland	7,9	41,9	33,7	7,0
Sweden	12,8	34,1	23,6	13,1

7 European Commission, (2002): Agriculture in the European Union, Statistical and economic information 2001, Brussels, Belgium

Table 2: (continued) Number of Farmholdings (1.000) by size in the Year 1997				
Country	< 5 ha	5 - 20 ha	20 - 50 ha	> 50 ha
United Kingdom	36,2	63,1	55,4	39,9

Source: European Commission

The climatic diversity in the EU allows the cultivation of a large number of crops and the growing season ranges from North to South between 170 to 300 days.[9] Table 3 shows the acreage of major crops grown in the current 15 EU Member States, these account for 52% of the agricultural land.[10] The remaining 48% agricultural land is mainly used as pastures and other permanent greens for dairy and meat production.

Table 3: Acreage of Major Cultivated Crops Grown in the EU	
Crop	Area in 1.000 ha
Cereal (total excl. rice)	36.401
Rice	396
Sugar beet	2.043
Oilseeds (total)	5.167
Olive trees	3.518
Cotton	539
Tobacco	73
Hops	21
Potatoes	1.404
Dry pulses	1.572
Fresh vegetables (total)	1.272
Fresh fruit (total) excl. citrus fruits	5.979
Citrus fruit (total)	560
Almonds	817
Wine	3.447
Flowers and ornamental plants	55
Green fodder	4.051

Source: European Commission

8 Sumelius, J., (2000): A Review of State of Sustainability of Farming Systems in the Selected Central and Eastern European Countries, Food and Agriculture Organization (FAO), Rome, Italy

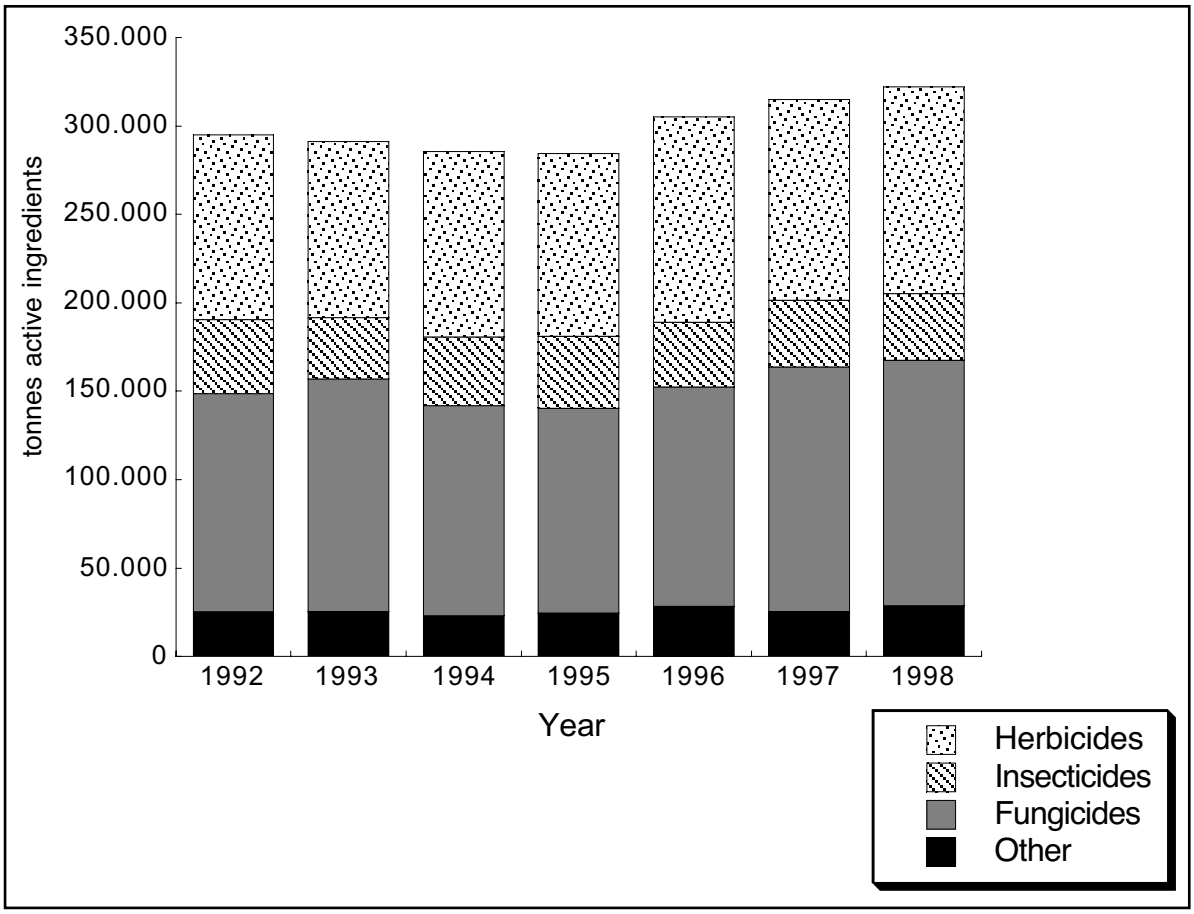
9 Website of the Ministry of Agriculture and Forestry, Finland: http://www.mmm.fi/english/agriculture/agriculture.htm

10 European Commission, (2002): Agriculture in the European Union, Statistical and economic information 2001, Brussels, Belgium

5 Pesticide Use in the European Union

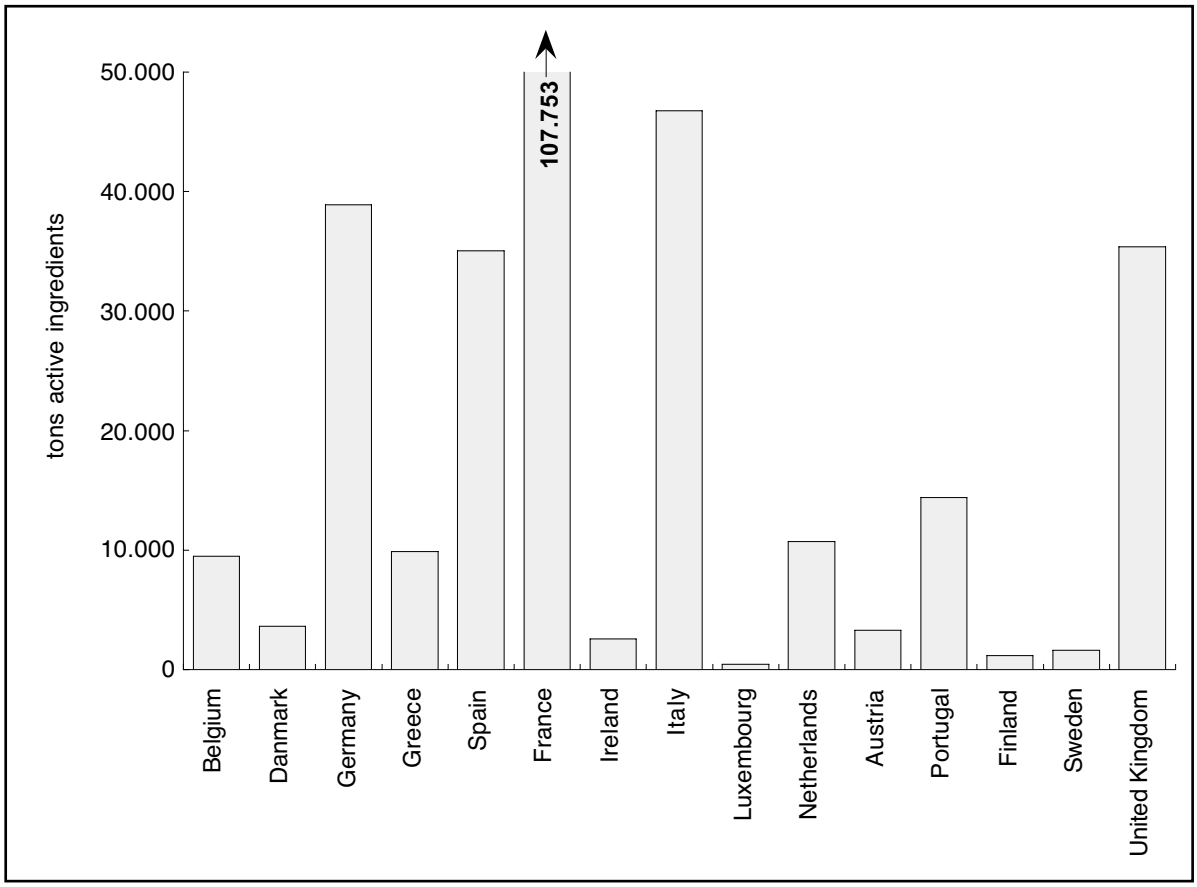
The common way to track data on pesticide use in the EU is the collection of sales data. The most recent data published by EUROSTAT are from 1998. For some Member States these data include non-agricultural pesticide sales . Some Member States also include sales data of sulphur, sulfuric acid and mineral oil or gases which are used as pesticides in large quantities. Figure 1 presents the total amounts of pesticides sold in the EU by use type. Figure 2 shows the amounts of pesticides sold in the year 1998 by Member State.[11]

Figure 1: Amounts of Pesticides Sold in the European Union 1992 - 1998



11 European Commission, EUROSTAT, Directorate F: Agricultural, environmental and energy statistics, Unit F-3: Environment, Annual pesticides sales data provided by Member States, Luxembourg, 2002

Figure 2: Amounts of Pesticides Sold in the EU Member States in 1998



Based upon these sales data Eurostat, the statistical agency of the European Union, calculates the intensity of pesticide use per area. Table 4 shows that the intensity varies among the Member States. The BENELUX countries have the highest use of pesticides per hectare followed by the United Kingdom, France and Portugal. Finland and Sweden have the lowest pesticide use per hectare in the EU.

Table 4: Intensity of Pesticide Use by Member State in 1998

Country	Applied amounts active ingredient per hectare agricultural land (kg/ha)
EU-15	**3,88**
Belgium	11,89
Netherlands	10,97
Luxembourg	6,84
United Kingdom	5,56
France	5,52
Portugal	4,99
Italy	4,22
Germany	3,21

Table 4: (continued) Intensity of Pesticide Use by Member State in	
Country	Applied amounts active ingredient per hectare agricultural land (kg/ha)
Greece	2,97[a]
Ireland	2,36
Austria	2,27
Spain	1,84
Denmark	1,43
Sweden	0,60
Finland	0,54

a 1996 data

In the year 2000 Eurostat published more detailed pesticide use data. Eurostat contracted for this data collection the pesticide industry through the European Crop Protection Association (ECPA). The members of ECPA submitted data from their annual surveys and other market research panels. The publication covered the period 1992 - 1996 and includes pesticide sales data by chemical class for a number of crops. Even sales data for some active ingredients were made available. For each Member State a list of active ingredients per crop group was presented.

Eurostat classified for this analysis two main types of crops: arable crops and specialty crops. These two types were broken down into several crop groups with specific crops associated. Table 5 presents the Eurostat crop classification.[12]

Table 5: Eurostat Crop Classification			
Crop type	**Crop group**	**Crops specified**	**Associated crops**
Arable	Cereals	Wheat	Winter wheat, spring wheat, durum
		Barley	Winter barley, spring barley
		Cereal (not specified)	
	Sugar beets	Sugar beets	
		Fodder beets	
	Maize	Grain corn/ maize	
		Green (silage) corn/ maize	
	Oilseeds	Rape seed	Winter rape, swiping rape
		Sunflower seed	
	Potatoes	Potatoes	Ware and seed potatoes

Table 5: (continued) Eurostat Crop Classification

Crop type	Crop group	Crops specified	Associated crops
Specialty	Citrus	Citrus	All types
	Vineyards	Grapes	
	Tree fruits	Pome fruit	Apples, pears (dessert)
		Stone fruit	cherries, plums, apricots, nectarines etc.
		Orchards	
		Fruits (not specified)	
	Vegetable	Brassicas	cabbage, cauliflower, Brussels sprout, turnip rape etc.
		Curcubits	Cucumber, melons, squash, zucchini etc.
		Peas and beans (Pulses)	Peas and bean for fresh or canned consumption
		Tomatoes	
		Vegetables (not specified)	

Source: Eurostat, 2000

5. 1 Pesticide Use by Crop Type and Crop Group

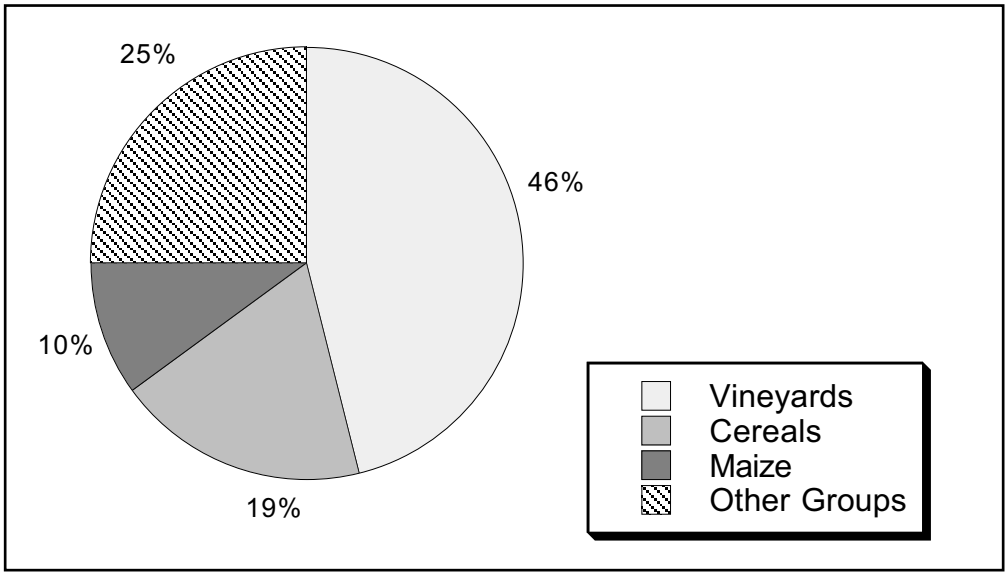
The Eurostat study gives an overview of pesticide use by crop type and crop group. The study states that the majority (60%) of the active ingredients (AI) volume was used in specialty crops (12% of the reference crop area) and 40% in arable crops.

46% of the total AI volume used in the EU agriculture was applied in vineyards. Cereals accounts for 19% and maize for 10% of the AI volume used (see Figure 3). The high use in vineyards is due to high dosage rate compounds such as inorganic copper and sulphur used as fungicides against mould and mildew species. 69% of the total fungicide use is applied in vineyards.

In arable crops, 69% of the applied amounts are herbicides. In specialty crops 82% of the applied amounts are fungicides.

12 European Commission, Eurostat, (2000): Plant protection in the EU - Consumption of plant protection products in the European Union, Luxembourg

Figure 3: Pesticide Use by Crop Group in the EU in 1996 (%)



Source: Eurostat, 2000

5. 2 Pesticide Use by Chemical Class

According to Eurostat/ ECPA the substances sulphur and copper accounted for 41% of all AI volumes in the EU in the observed time span. Urea herbicides played an important role in cereal weed control. Isoproturon was the most frequently used urea herbicide. Triazine herbicides were used for annual and perennial weed control, mostly in fruit orchards, maize and vineyards. Chloroacetanilides such as Alachlor and Metolachlor were frequently used for selective weed control in rape and maize. Organophosphate insecticides were still frequently used in 1996.

Table 6: Chemical Classes Representing More Than 80 % of all Sold Active Ingredients (AI) Volume for the EU in 1996

Chemical class	**AI volume (1000 tons)**	**Share of AI volume (%)**
Inorganic sulphur	90,1	36,1
Triazine	18,3	7,3
Dithiocarbamate	15,5	6,2
Urea	12,8	5,1
Inorganic copper	11,1	4,4
Amino-phosphoric acid	10,4	4,2
Azole	9,0	3,6
Chloroacteanilide	7,8	3,1
Morpholine	5,4	2,2
Phenoxycarbonic acid	5,4	2,1

Table 6: (continued) Chemical Classes Representing More Than 80 % of all Sold Active Ingredients (AI) Volume for the EU in 1996

Chemical class	**AI volume (1000 tons)**	**Share of AI volume (%)**
Organophosphate	4,9	2,0
Phtalic acid	4,4	1,8
Dinitroaniline	3,6	1,4
Triazinone	3,3	1,3
Total	**202,2**	**80,9**

Source: Eurostat, 2000

5. 3 Pesticide Registration in the European Union

In the European Union two legal instruments regulate pesticide active ingredients. The authorization of pesticide active ingredients is regulated through Council Directive 91/414. Major goal of this Directive is to harmonize the authorization of plant protection products, and to establish a positive list of active ingredients on its Annex 1. Member States can only authorize plant protection products containing active ingredients listed in Annex 1, and under consideration of its efficiency, human toxicity, environmental fate, impact of non-target organism and other aspects listed in Article 4 of Directive 91/414.[13] In accordance with Directive 91/414 pesticide active ingredients, which were authorized before 25th July 1993 must be newly reviewed regarding their toxicity and environmental fate utilising new test methods defined by other regulations. More than 800 pesticide active ingredients are undergoing this re-evaluation process. The manufacturers of pesticide active ingredients have to finance the toxicity tests and must submit specific dossiers. For many pesticides active ingredients, the expenses for the tests exceed the current or potential market volume. Therefore, for some 340 active ingredients new authorisation was not applied. After July 2003 the use of these 340 active ingredient is not allowed in the EU any more. The European Commissio assumes that further 150 active ingredients will be withdrawn by end of 2003. Altogether, some 60% of the over 800 active ingredients are then off the market.[14]

Table 7 presents the number of authorized products, active ingredients, and the number of registrants in 9 Member States for the year 2002. These numbers as well as the spectrum of authorized pesticides will change considerably until the re-evaluation process is finished in 2008.

Table 7: Number of Authorized Plant Protection Product and Active Ingredient in 9 Member States in 2002

	B	**G**	**GR**	**F**	**NL**	**A**	**P**	**FIN**	**UK**
Number of authorized products	1397	924	1632	7900	1367	930	872	393	3928

13 European Union (1991): Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market, Official Journal 230, Brussels, Belgium

14 European Commission, Press release 4th of July 2002: 320 pesticides to be withdrawn in July 2003, http://europa.eu.int/comm/food/fs/ph_ps/pro/index_en.htm

Table 7: (continued) Number of Authorized Plant Protection Product and Active Ingredient in 9 Member States in 2002

	B	G	GR	F	NL	A	P	FIN	UK
Number of registered active ingredients	380	270	373	433	264	330	268	186	367
Number of registered "inert"[a] ingredients	-	1500	-	-	-	-	-	-	-
Number of registrants	199	156	110	2000	-	90	1[b]	68	348

a "inert" ingredients: substances which can enhance the efficiency of the active substance, make a product more degradable or easier to use. "Inerts" are mostly handled as trade secrets of the manufacturer, which means they are not labelled on the product.

b In Portugal, there is apparently only one company which does register all products for all pesticide manufacturer.

Source: PAN Germany, Questionnaire to Member States

6 Computer Use and Internet Access in European Agriculture

Information about the percentage of farmers using computers and accessing the internet are not available for the whole EU. Questions regarding these information were sent out to the Member States, but could not be answered by the officials. However, some data about German farmers could be obtained. In Germany, there is a continuously increasing number of farmers, who use computers and the internet. The percentage of farmers with internet access advances apparently in proportion to the size of the farms. Numbers from the year 2000 show that 30% of the farm holders with farms bigger than 20 ha, 45% with farms bigger than 50 ha have internet access. This is an increase by the factor 4 in 4 years. The German Agricultural Society (DLG) states that 66% of the custom applicators and 75% of the leading farmers use the internet to obtain weather forecasts, information on occurrences of certain pests and regarding plant protection measurements.[15]

Several reasons exist for the increase of internet use among farmers. Internet compatible computer and online fees are much cheaper than several years ago. New computers always contain a fast modem and internet software, even recent second hand computers are internet compatible. Many farmers want to spare the way to the bank and perform online banking. The new generation of farmers obtained computer skills already at school.[16] Additionally, there is an increasing number of useful agricultural software tools. One of the leading agricultural journals in Germany, for example, provides Microsoft Excel data sheets for field/site specific documentation, economic calculations, and proposals for the application of financial aid.[17] These Microsoft Excel tables are developed by farmers for farmers and they are available at no charge.

15 Industrieverband Agrar (2002): Jahresbericht 2000/2001, Frankfurt/Main, Germany
16 personal communication with Henrich Meyer, PRO_PLANT GmbH
17 website of Top Agrar: www.topagrar.de

7 Options for a European PUR System

Table 2 shows that some 7 million farmholdings exist in the current 15 EU Member States. Over 30 million farm holdings exist in the countries, which are going to be Member States in the future. Even if the Western European trend of a decreasing number of farm holdings will affect Eastern Europe in the same way, the number of farm holdings will probably exceed 20 million in the enlarged EU in the future. Considering these numbers, implementation of a pesticide use reporting system in which all farmers report every application (full reporting) seems to be difficult. While discussing different options it needs to be considered that a European PUR system has to be created entirely new. A legal base for mandatory record keeping does not yet exist. This means applicators are not used to track their use. A central product registration does not exist as well. In 9 Member States which answered a questionnaire, over 19.000[18] pesticide products are authorized, most of them could be traded easily among Member States. Use of products with foreign product names and product numbers could currently hardly be tracked by use reporting systems established by individual Member States.

However, there are different options for the EU and individual Member States to create pesticide use reporting systems which consider different stages of the agricultural and technical development, but which are still consistent to some extent. The different options are based upon two parameters:

- the data entry format and data processing, and
- the extent of the reporting.

Both parameters cannot be examined independently. Currently, there are still many farmers in the EU, who do not use a computer, but the number of farmers, who use computer and the internet is continuously increasing. In the future other ways of pesticide use reporting might be practicable than today.

7. 1 Data Entry Format and Data Processing

There are two common ways to report pesticide use, electronically or using paper forms. The PUR system, recently established in the U.S. State Oregon works entirely electronically. Applicators submit data via the internet or via floppy disks. The latter way will mostly be used by pest control companies, which conduct large numbers of applications. The Oregon Department of Agriculture (ODA) is still developing the data transfer format for this way of reporting.

In Oregon, there is no manual data entry on governmental level. The reporting person submits its records directly to the database of the Oregon Department of Agriculture. He/ she enters an online database using a password and the Reporter ID Number. An applicator who submits use records the first time, needs to register and gets in return password and Reporter ID Number. After entering password and Reporter ID Number user specific information show up on the screen and the reporting person adds its new pesticide use record. Validation and error checking already happens online, e.g. incomplete data sets cannot be submitted, wrong product numbers and grid information are recognised by the database. The online database currently in use is just provisional, the Oregon Department of Agriculture expects to have a final database online in November 2002. The final version will have many more capabilities and features than the current version.[19]

18 Please note, this is the cross sum from table 7, there are probable many identical products registered, but the number of how many different products are registered in the EU is not known.

Pesticide applicators who do not have PC/Internet access have several options to submit data. They may send paper based records to a third party who enters data into the online ODA database for a certain fee. Pesticide dealers might do this for their customers for a little or no fee. Pesticide dealers have made computers available during certain hours for pesticide users to enter their reports. Use of public computers in libraries and community colleges is another option.[20]

In California, applicators report their pesticide use electronically or using paper forms. In both cases, data are usually submitted to the County Agricultural Commission (CAC). In the CAC office, the staff manually enters data, which are submitted by paper forms into a database. The staff also conducts a first data validation and error checking. The reporting person can also access the CAC data base via the internet and submit his /her records this way. The level of electronic reporting in California is continuously increasing.[21]

The CAC data are frequently submitted to the State agency, the Department of Pesticide Regulation (DPR). At DPR, a second data validation and error checking procedure is conducted. Erroneous records are send to the CAC office for resolution.[22]

The New York State Department of Environmental Conservation, which is responsible for the New York PUR system developed scannable paper forms to make data entry more efficient. Use of these forms was recently phased out, because to many errors occurred due to handwriting.[23]

The California and the Oregon example clearly have advantages and disadvantages. The California PUR system does not entirely depend on PC and Internet access, but is quite labour intense. Utilising the regional CACs in the PUR process splits the amounts of data. Under the aspect of possible follow up measures the involvement of regional agencies in the California PUR process can be seen quite positive. These agencies are eventually responsible for the enforcement and control of regulations or pesticide reduction programs. Their participation is one corner stone to the success of regulations. Additionally, due to the pesticide use permission process, and the daily cooperation on County level the CACs know most of the applicators. This ensures compliance with the regulation, and an easier resolution of erroneous records to some extent.

The Oregon PUR system entirely depends on PC and Internet access, but is less labour intense on governmental level. Pesticide applicators report directly to the State. Regional agencies such as the CACs in California do not exist in Oregon.

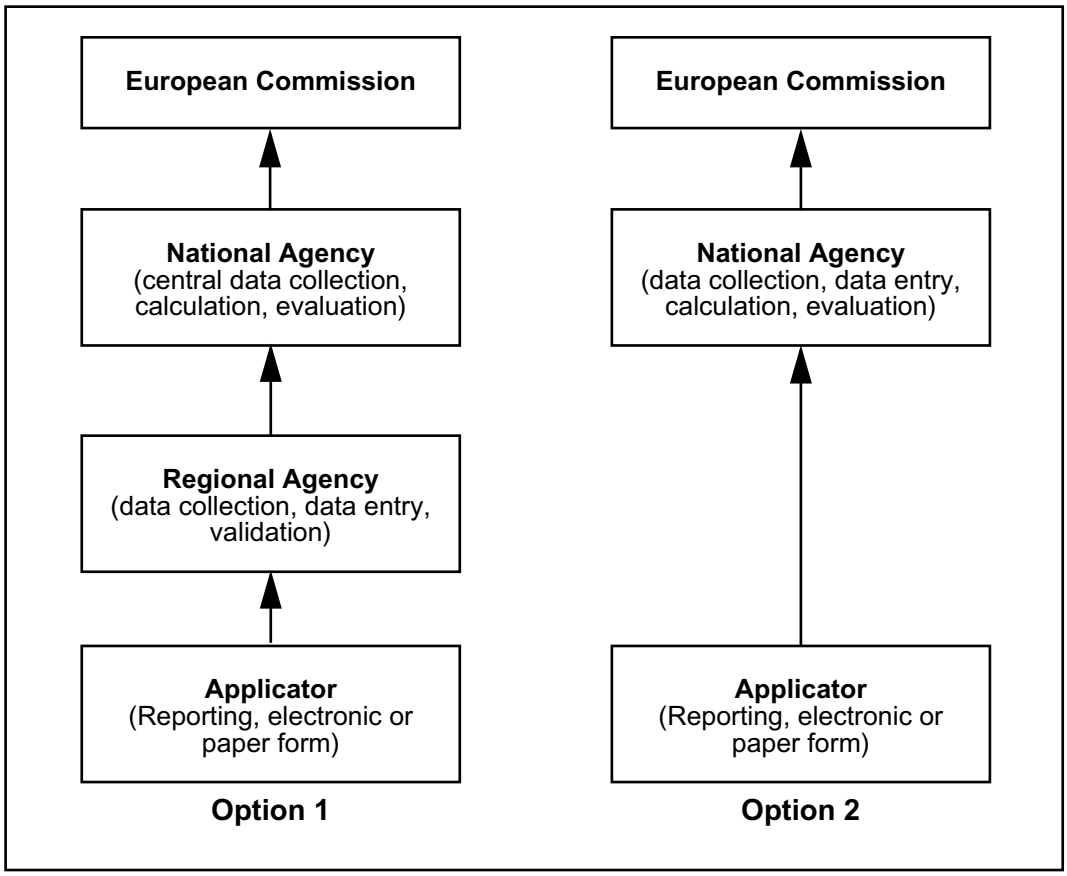
It needs to be considered that any legal framework requiring pesticide use reporting cannot distinguish between persons, who have Internet access and those who do not. Each Member State of the European Union needs to analyse its agricultural structure, its resources, as well as farmers access of PC and Internet. The Oregon example shows that possible third-parties offer services if demand exists.

19 personal communication with Christopher Kirby, Pesticide Division, ODA
20 personal communication with Roland Maynard, Pesticide Decision, ODA
21 ibid 3
22 ibid 3
23 personal communication with David L. Jenning, Pesticide Control Specialist, New York State Department of Environmental Conservation

Figure 4 shows two options, how data flow in pesticide use reporting systems can work. Option 1 is similar to the California model. The pesticide applicator reports to a regional agency, the County Agricultural Commissioner. Data collection, data entry from paper records and a first validation is done at this level. The regional agency then submits its data to the State agency. Such model could also be applied in MS, which have decentralized official structures.

In Germany, for example, 16 Federal States exist. Each State maintains its own agencies responsible for agriculture. In the Western States of Germany, Chambers of Agriculture are common. These have similar task on State level as the CACs in California and could be the focal point to gather pesticide use reports. In the Eastern part (formerly GDR) the State Ministries responsible for agriculture could take over this role. The county agencies in the 16 German States are usually not involved in agricultural production, their agricultural tasks are more related to land use planning and property rights.

Figure 4: Data Flow Options in Pesticide Use Reporting Systems



7. 2 Extent of the Reporting

The extent of a reporting system is mainly determined by three factors: who reports, what is reported and how often is reported. Table 8 illustrates different options with regard to their capacity to protect human health and the environment and to their feasibility. A PUR system holds a high capacity to protect human health and the environment, if the reporting frequency is high, and the reported data specify the applied substance(s), the amounts used, the date of application, the crop and location (see Chapter 7. 4 on page 22). The feasibility depends mainly on the resources of the applicators (time, technical equipment) as well as on the resources of the

Member State (human resources, technical equipment, existing data). Legal issues such as property rights, equal treatment also need to be considered.

Table 8 presents an approach to weigh different options using a scale from *high, moderate, low* for the capacity to protect human health and the environment. A scale ranging from *difficult, possible, good* was used for the feasibility. *Difficult, possible, good* are defined as

Difficult	high amount of data and implementation would need high input of resources,
Possible	reduced amount of data and implementation would need less input of resources
Good	reduced amount of data and implementation would need little input of resources

The scaling is discussed in the table. Weighing is mostly based upon assumptions derived from the experience with PUR system in other countries, and from knowledge gathered during previous projects.[24 25 26 27]

Table 8: Options for the Extent of the Reporting System, their Capacity to Protect Human Health and the Environment, and their Feasibility

Option for the Extent of the Reporting System	**Capacity to protect human health and the environment**	**Feasibility**
Who reports		
All farmers	**High** - Data set is comprehensive and representative.	**Difficult** - In Member State with a high number of farms, with low technical development and little resources reporting by all farmers seems unmanageable.
Farmers with farm holdings bigger than a certain acreage (>1ha, >5 ha >10ha etc.)	**Moderate to Low** - Depending on the size limit. Nurseries and orchards are often smaller than arable farms but use more pesticides.[a]	**Good to Difficult** - This depends on the limit, bigger farms have usually better access to PC and Internet than smaller farms. Could cause legal problems due to inequality.
Farmers whose main income derives from agriculture (full-time farmers)	**Low** - In Germany only some 40% of the farms are managed by full-time farmers.[b] Old fashioned application equipment and insufficient education are more probable in part-time holdings.	**Good** - It is more likely that full-time farmers already keep track of their pesticide use, and that they have better access to PCs and Internet.

Table 8: (continued) Options for the Extent of the Reporting System, their Capacity to Protect Human Health and the Environment, and their Feasibility

Option for the Extent of the Reporting System	**Capacity to protect human health and the environment**	**Feasibility**
Farmers who get financial aid from the European Union	**High to Low** - Depending on the supported crops and the number of holdings.	**Good** - Farmers already report with their aid application a certain agricultural dataset. Use reporting could be a condition for financial aid.
Farms who participate in the farm accountancy data network (a number of ca. 58.000 across the EU)[c]	**Low** - Only full-time farmers participate, the number of 58.000 participating farms would have the character of a survey. The number is too low to determine problematic regions.	**Good** - Farmers already report agricultural and economic data to the EU.
Farmers who grow certain crops (fruit, vegetables, nurseries, tree nurseries/ orchards, hops)	**High to Low** - Depending on the chosen crops. In specialty crops, a high treatment frequency and use of more toxic pesticides is common, causing higher numbers of food residues. Arable crops are associated with a higher number of water contaminations.[d]	**Possible** - The exclusion of certain crops would reduce the amount of data.
Farmers in certain regions	**High to Low** - Depending on the character of the regions. **High** - If all regions are chosen, which have sensitive soils and/or high potential for water contamination, and/or high biodiversity and/or high human population. **Low** - If regions mentioned above are not included.	**Possible** - Would reduce the amounts of data. Compliance control is easier. Could cause legal problems due to inequality.

24 ibid. 3

25 Neumeister, L., Mücke, M., Ruhnau, M., Weber, C. (2002): From Law to Field - Pesticide Reduction in Agriculture, From Residue Analyses to Action, Pesticide Action Network Germany, Hamburg, Germany

26 Kegley, S. E., Neumeister, L., Martin, T. (1999): Disrupting the Balance, Ecological Impacts of Pesticides in California, Pesticide Action Network North America, San Francisco, USA

27 Kegley, S. E., Orme, S., Neumeister, L., (2000): Hooked on Poison; Pesticide Use in California 1991 - 1998, Pesticide Action Network North America, San Francisco, 2000

Table 8: (continued) Options for the Extent of the Reporting System, their Capacity to Protect Human Health and the Environment, and their Feasibility

Option for the Extent of the Reporting System	**Capacity to protect human health and the environment**	**Feasibility**
Commercial agricultural applicators (custom applicators)	**Low** - Probable only a small percentage of applications are conducted by custom applicators. (there are ca. 2000 custom applicators in Germany)[e]	**Good** - Would reduce the amounts of data. High percentage of PC and Internet access, professionally educated.
What is reported		
Every single application	**High** - Poisoning incidence can be traced back accurately.	**Difficult** - Applicator needs to keep individual application records. Increases the workload of the applicator. Large amount of data.
Total amount of a specific product by field and crop	**High to moderate** - Depending on the reporting frequency.	**Good** - Lower workload for applicator, smaller amount of data.
Use of certain pesticides	**High to low** - Depending on the chosen pesticides.	**Possible** - Would reduce the amounts of data, but applicators need to learn which pesticides have to be reported. Alterations are harder to enforce.
Reporting frequency		
7days post application	**High** - Reported poisoning incidents can be traced back almost immediately. Good for medical treatment of poisoning. Surface Water and air quality can be measured timely close to applications.	**Difficult to Good** - Depending on the immediate workload of the reporting person. Requires positive commitment.
Monthly	**Moderate** - Reported poisoning incidents can traced back within a relatively short time frame. Surface Water and air quality can be measured timely relatively close to applications.	**Good** - Reporting person can schedule reporting for times with lesser workload.
Quarterly	**Moderate** - Longer time spans between application and reporting do not allow environmental monitoring timely close to applications.	**Good** - Reporting person can schedule reporting for times with lesser workload.

Table 8: (continued) Options for the Extent of the Reporting System, their Capacity to Protect Human Health and the Environment, and their Feasibility

Option for the Extent of the Reporting System	Capacity to protect human health and the environment	Feasibility
After the growing season	**Moderate** - Longer time spans between application and reporting do not allow environmental monitoring timely close to applications.	**Good** - Reporting happens in time with lower workload.

a see Chapter 5 Pesticide Use in the European Union on page 7
b Bundesministerium für Ernährung, Landwirtschaft und Forsten (2000): Agrarbericht der Bundesregierung 2000, Berlin, Hamburg
c ibid. Footnote 7
d ibid. Footnote 25
e personal communication with Helmut Hirrig, Bundesverband Lohnunternehmen (Federal Association of Custom Companies)

In order to create useful and efficient PUR systems, options described above can be combined. For example, all options which are probably easy to implement such as reporting by custom applicators and large scale farmers should be included. Any exclusion of farms with a small acreage needs to be discussed, since pesticide intense crops such as vegetables, hops, flowers, grapes and other specialty crops are often grown on small farms or nurseries. For different types of farmers reporting frequencies and reporting requirements could vary. Small arable farmers with a size under 10 hectare could submit quarterly summaries which contain data on the total amount of a specific product by field and crop. Certified organic growers could be excluded from reporting, since use of highly toxic and residues causing pesticides is heavily restricted.

However, the various combinations and the extent depend on the resources of the Member State as well as on the resources of the individual grower. A PUR system can be implemented step wise. In California certain applicators filed use records at the CAC office already in the 1960ties. Back then, these records were not processed by the CAC. The implementation of a full pesticide use reporting system in California has been a long process and was not planned in detail from the beginning.

7. 3 Ranking the Usability of Specific Pesticide Use Data

In May 2000, the Oregon Department of Agriculture published the study: “Oregon Pesticide Use Reporting System. Analytical Review.” [28] This 175 pages study was conducted by a team of researchers at the Oregon Health Sciences University and the Oregon State University. In this study the researchers ranked the usefulness of data fields potentially reported. Goal of the ranking was to find out, what reported data are useful for 10 specific areas of investigation as well as for data management, assuring data quality, and assessing trends. The ranking scheme comprise four ranks:

3 = most useful
2 = useful

28 Rothlein, J., Jenkins, J. (2000); Oregon Pesticide Use Reporting System, Analytical Review, Oregon Department of Agriculture, Salem, USA

1 = less useful
0 = not useful

The researchers have also discussed in length the usefulness of information provided by a pesticide use reporting system for individual programme and research areas. These include:

- Integrated Pest Management
- Water Quality
- Drinking Water
- Fish and Wildlife
- Human Epidemiology
- Risk Assessment
- Public Health
- Worker Health and Safety
- Food Quality Protection Act[29]

Table 9 presents the ranking of the usefulness of data potentially collected from agricultural pesticide users. The outcomes of the whole discussion will not be repeated here. The ranking and the discussion can be found in Appendix 1.The full study can be downloaded at the ODA website.[30]

Table 9: Usefulness of Data Potentially Collected from Agricultural Pesticide Users

	Data Usability										
Reporting Fields	Water Quality	Drinking Water	Fish & Wildlife	IPM	Human Exposure	Public Health	Risk Assessment	Worker Health & Safety	Data Quality	Data Management	Trends
Location											
Street	3	3	3	3	3	3	3	3	3	3	3
City	2	2	2	2	2	2	2	2	3	2	2
County	1	1	1	1	1	2	1	1	3	1	1
Postal Code	2	2	2	2	2	2	2	2	3	2	2
1/4 Section	3	3	3	3	3	3	3	3	3	3	3
Section	2	2	2	2	2	2	2	2	3	2	2
Range	1	1	1	1	1	1	1	1	3	1	1
Watershed	3	3	3	3	1	3	3	1	2	3	3
Product and Site											
Product Name	3	3	3	3	3	3	3	3	3	3	3
EPA Registration #	3	3	3	3	3	3	3	3	3	3	3
Quantity of Product applied	3	3	3	3	3	3	3	3	3	3	3
Site/ Crop	3	3	3	3	2	3	3	3	3	3	3
Pest/ Purpose	3	3	3	3	1	3	3	3	3	3	3
Month of Application	2	2	2	3	2	2	2	2	3	2	2
Frequency of Reporting											
7 days Post application	2	1	2	3	1	2	2	3	2	1	1
Month post application	3	2	2	3	2	2	2	2	2	2	1
Quarterly	3	3	2	2	2	3	2	2	2	2	2
Annual	2	3	3	2	3	2	3	2	1	1	1
Other Fields											
Date of Application	3	3	3	3	3	3	3	3	3	3	3
Time of Application	1	1	2	2	1	1	2	2	2	2	2
Units	3	3	3	3	3	3	3	3	3	3	3

29 The Food Quality Protection Act (FQPA) is an US legislation, the column evaluating the usefulness is not included in Table 9.

Table 9: (continued) Usefulness of Data Potentially Collected from Agricultural Pesticide

	Data Usability										
Reporting Fields	Water Quality	Drinking Water	Fish & Wildlife	IPM	Human Exposure	Public Health	Risk Assessment	Worker Health & Safety	Data Quality	Data Management	Trends
Adjuvants and Additives	2	2	2	2	2	2	2	2	2	2	2
Application rate	3	3	3	3	2	2	3	2	3	3	3
Use Dilution	2	2	2	3	2	2	2	2	1	1	1
# Acres planted	3	3	2	3	1	1	2	2	1	1	2
# Acres Treated (acres or sq ft.	3	3	3	3	2	2	2	3	3	3	3
Application Method	2	2	2	3	3	2	2	3	2	2	2
Application Equipment	1	1	1	3	3	2	1	3	1	1	1
Business Name	3	3	3	3	3	3	3	3	3	3	3
License Number	3	3	3	1	3	3	3	3	3	3	3
Month/Year of Reporting	3	3	3	1	3	3	3	3	3	3	3
Applicator Name	2	2	2	2	2	2	1	3	3	3	2
Applicator License #	3	3	3	1	2	2	1	3	3	3	3
Business Phone Number	3	3	3	3	2	2	2	3	3	3	3
Other requested Fields											
Weather Conditions	2	2	2	3	2	2	2	2	0	1	2
Neighbour Notification	1	1	0	1	1	2	1	0	0	1	1
Protective Equipment	1	1	0	1	2	2	1	3	0	1	1
Nearby Wells	2	3	0	3	3	3	2	2	0	1	2
Nearby sensitive areas (water, wetlands, schools)	3	3	3	3	3	3	3	2	0	1	3
Disposal Method	2	2	1	2	1	3	2	2	0	1	2
Harvest Date (Preharvest Interval)	0	0	0	3	2	3	2	2	0	1	2
Active Ingredient	3	3	3	3	3	3	3	3	3	1	3
Water application	3	3	3	3	2	3	3	1	0	1	1
Re-entry	-	-	-	-	2	3	2	-	-	-	-

7. 4 Locating Pesticide Use in the European Union

There are several options for reporting the location of pesticide use in the EU. One criterion for an efficient PUR system is that the reported locations should be small scaled. Criteria for convenient and practical reporting of the location are that the farmer can use existing location identification and that these are not affected by changing crop rotation systems.

7. 4. 1 Geographic Positioning System

Farmers operating precision farming could report the GPS (Geographic Positioning System) of their application coordinates. This is the most exact possibility. Even strip and spot treatment could be reported this way. The use of GPS on farms is increasing and some producer association provide GPS devices at small charges to member farmers, which want to determine the coordinates of their fields. An electronic PUR system would allow feasible use of GPS coordinates. The first time in a growing season a person reports pesticide use he/she could enter the

30 Website: http://purs.oda.state.or.us/analytic_review/analytic.html

GPS coordinates of his/her fields, and gets in return unique field numbers valid for one season. This number would be used over the season. In crop rotation system with changing field sizes this approach is rather difficult to apply.

7. 4. 2 INVEKOS

Farmers who get financial per hectare aid from the EU have to digitally submit maps of their fields until 2004 to the European Commission. These so called INVEKOS (integrated administration and control system) maps are private property and not publicly accessible. Each of the by INVEKOS registered could get unique ID numbers and the farmer could submit these information.

7. 4. 3 Digital Maps

In Germany, every piece of land has a number, and the communities and townships maintain archives containing maps with the land properties and the location ID. Most of these maps are older and often do not reflect outside-reality. Farmers often created larger fields which are comprised by several pieces of property. They often do not know where borders lay and what specific piece of property they operate. However, many of these maps have been digitised in recent years mostly due to urban development and tax reasons. There is currently no approach to establish a 100% coverage of Germany with such digital maps. Since communities are responsible for land property rights central updating of these digital maps would need enormous resources.

Other digital maps from aerial photos or calibrated by satellites have been created in the last years, and the process of digital mapping will proceed. In order to use this kind of maps in a PUR system a procedure which annually informs farmers about their field IDs needs to be established. The problem with maps based upon aerial photos are satellite picture is that they are not up to date. Field borders may change with crop rotation, and property borders cannot be determined at all.

7. 4. 4 Postal Codes

The Member States need to investigate what kind of location identification is known to all farmers. All over Europe with the exception of Ireland postal code areas have been established. In combination with a code for the individual Member State this number is unique. The postal code system is also widely known. Using postal codes in a PUR system has the disadvantage that in areas with a low population density especially in rural regions one postal codes numbers can cover a quite large area. Figure 5 shows postal code areas in 4 German States.

7. 4. 5 Community Borders

Another widely known location identification is the name of the community. There are communities which have the same name in one Member State, therefore additional regional information, such as departments, federal States etc. needs to be submitted. The size of the communities vary among the Member States. In Germany, some of the States have many small scaled communities, and some have larger scaled communities. Figure 6 shows community in 4 German States.

Paper records for pesticide use reporting and/or record keeping or Internet interfaces should allow small scale reporting such as GPS coordinates, as well as reporting on the level of the community border or postal codes.

Figure 5: Postal Code Areas in 4 German States

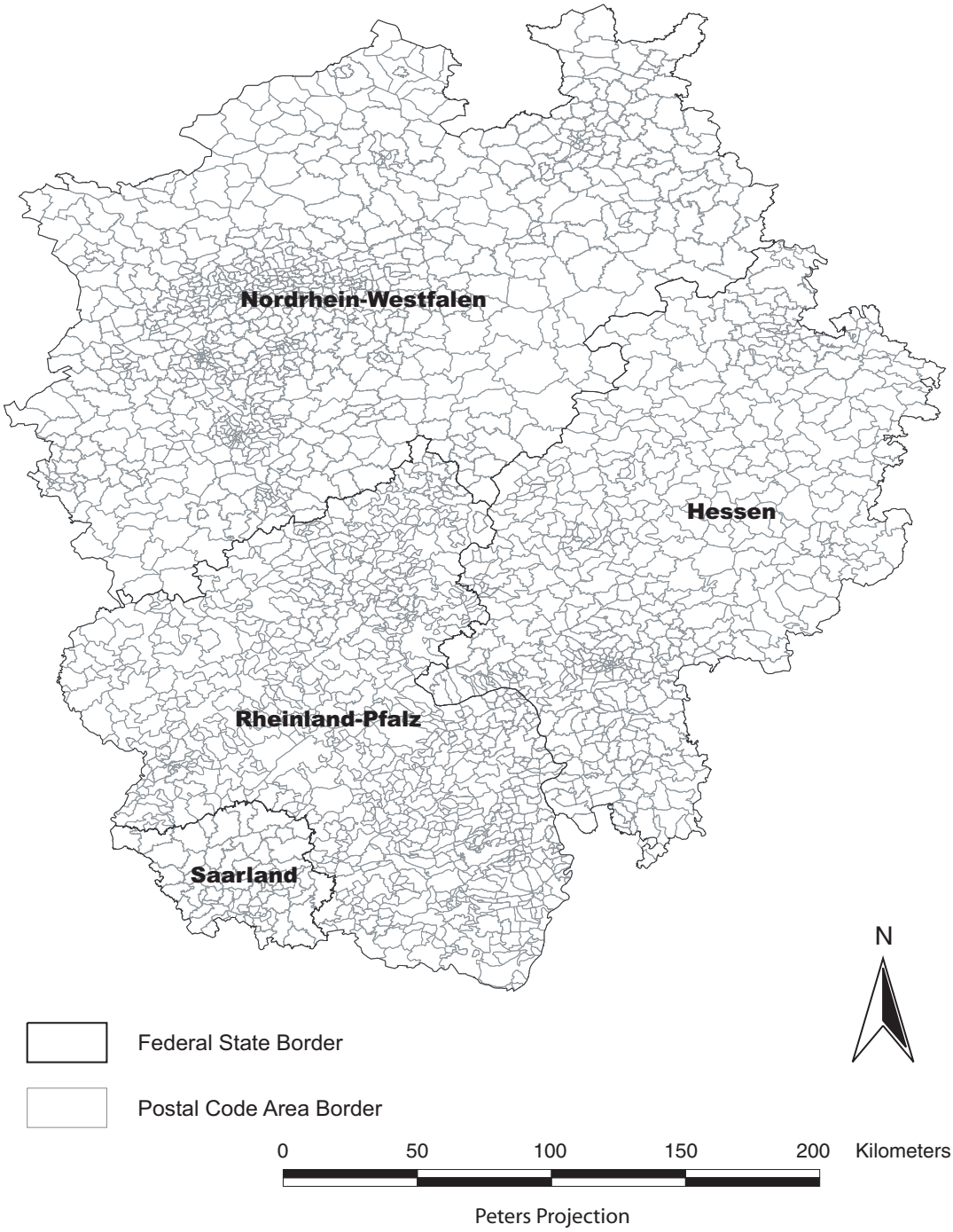
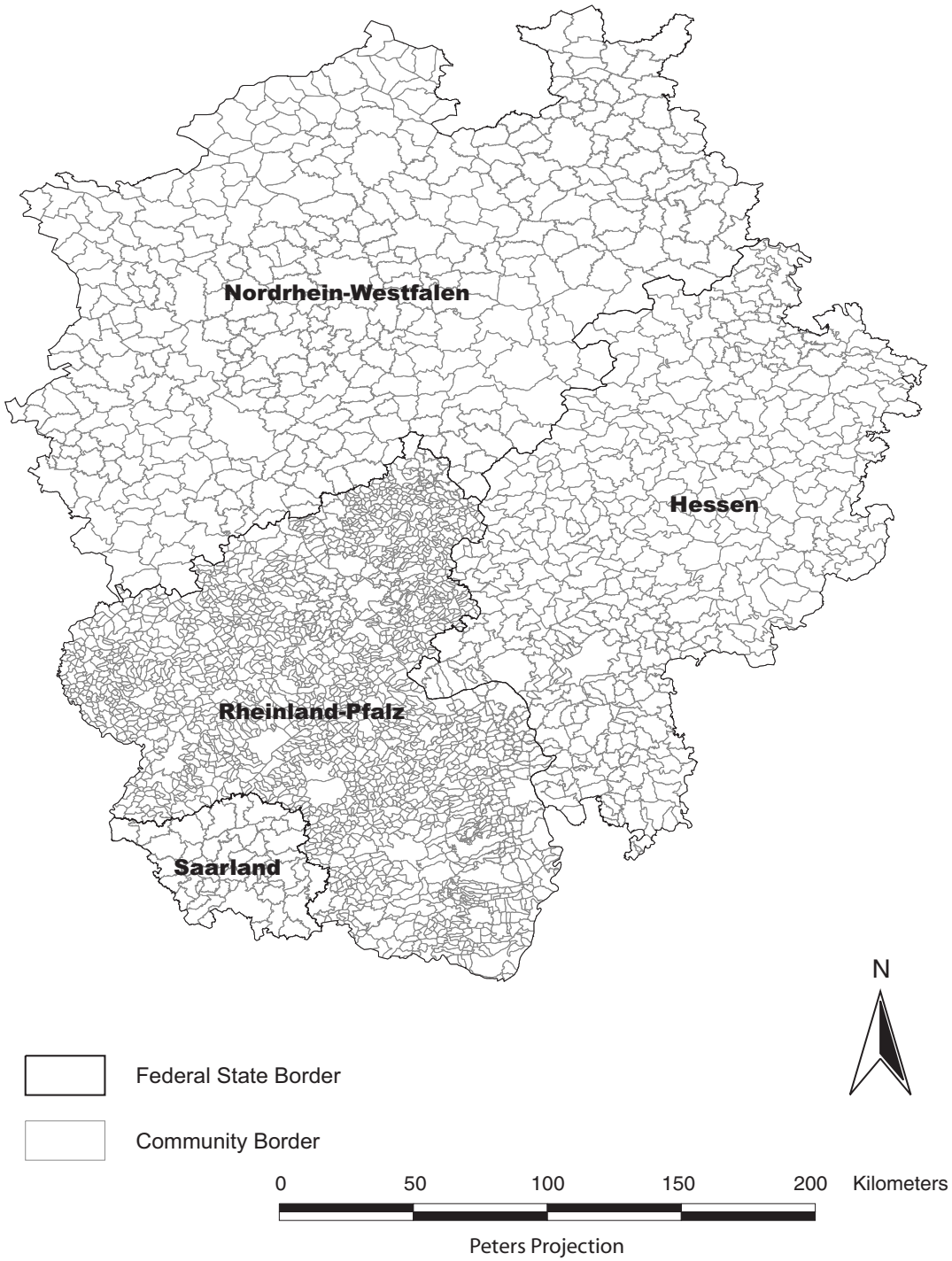


Figure 6: Community Border in 4 German States



8 Framework for a European PUR System

The previous Chapter presented various options for the EU and individual Member States to create pesticide use reporting systems which consider different stages of the agricultural and technical development. To ensure consistency to some extent an European framework must be set. In the European Union none of the basic conditions such as central pesticide product registration, mandatory record keeping or any legal instrument have been implemented. The next chapters will outline conditions needed to establish a PUR system, which is consistent to some degree.

The European Commission is responsible for setting-up this structure. The Member States are responsible for the implementation.

8. 1 Legal Framework

One of the first conditions to be created is a legal instrument expressing the need for reporting of pesticide use. This legal instrument must contain requirements for mandatory uniform record keeping, the establishment of a central product registration database, the establishment of a harmonised and a useful coding system, for industry responsibility and funding aspects. The regulation concerning PUR has to include the public availability of the reported data with respect to confidentiality regarding property issues.

8. 2 Mandatory Record Keeping

Mandatory uniform record keeping is essential for a functioning EU PUR system. The PUR regulation must require that pesticide use records are kept by all pesticide applicators. The records must include, at the minimum, following information about the applications:

- name and address of the applicator,
- community name/code, postal code or other identification of the treated field/site location,
- name and EU registration number (see Chapter 8. 3) for the pesticide product(s) used,
- quantity of the pesticide product(s) applied,
- application method,
- date of the application,
- size of the field/site treated,
- planted and treated acreage,
- name/ code of the crop treated.

Based upon mandatory record keeping a flexible and expandible PUR system can be developed. If all pesticide applicators have to keep the same type of record, the regulation concerning pesticide use reporting can differentiate what person is required to report what set of data in what frequency. This means all possible options as described in the previous chapters are thinkable. Full reporting e.g. submitting the all application record data is possible as well as summaries extracted from the records.

8. 3 Central Pesticide Product Database

One of the key features in the PUR systems of Oregon and California is the unique EPA product registration number. This number allows the calculation of the amounts active ingredient applied using a pesticide label data base. Three reported parameters, the EPA product registration number, the amount product used and the unit of measurement are calculated in pounds active ingredients for each reported record. The Member States of the EU were asked, which type of product registration database they maintain. Table 10 shows that some of the 9 responding Member States maintain comprehensive product databases, which even include to some extent non-agricultural products containing pesticide active ingredients.

Table 10: Pesticide Product Registration Databases in European Member States

Parameter	**B**	**G**	**GR**	**F**	**NL**	**A**	**P**	**FIN**	**UK**
Name of the Product	x	x	x	x	x	x	x	x	x
Names and CAS Number of active ingredients per product	-	x	x	-	-	x	x	x	-
Names and CAS Number of inert ingredients per product	-	x	x	-	-	x	-	-	-
Percentage for each active ingredient per product	x	x	x	x	-	x	x	x	x
Percentage for each inert ingredient per product	x	x	x	x	-	x	-	-	-
Number of active ingredients per product	x	x	x	x	-	x	x	x	x
Number of inert ingredients per product	-	-	-	-	-	-	-	-	-
Formula	x	x	-	-	-	x	x	x	x
Density	-	x	-	-	-	x	-	-	-
Gravity	-	x	-	-	-	-	-	-	-
Database includes non-agricultural pesticides	x	x	x	x	x	x	x	-	-
Recommended Application Rate	x	x	x	x	-	x	x	x	x
Toxicity according to Directive 1999/45 EEC or Directive 67/548 EEC	x	x	x	x	-	x	x	x	x
Product Registration Number	-	x	x	x	x	-	x	x	x
List of crops the product is registered for	x	x	x	x		x	x	x	x

Source: PAN Germany Questionaire to 15 Member States

Pesticide products are traded between EU Member States. If a person reports use of an imported pesticide to a responsible agency at the moment using its foreign product number, the responsible agency would be unable to efficiently calculate the amounts active ingredients applied. Therefore, a central product registration database and an unique EU product registration

number are needed. Such a product registration database could be located at the European Chemicals Bureau (ECB). Each manufacturer/registrant of a pesticide product has to submit electronically the following data for each individual pesticide product to a central database:

- Name of the pesticide product,
- Name of the Member State where the product is approved,
- Name and CAS number of the active ingredients,
- Amounts, volume and percentage of the active ingredients,
- Name and CAS number of the inert ingredients,
- Amounts, volume and percentage of the inert ingredients,
- Chemical class of the active ingredient,
- Chemical class of the inert ingredients,
- Identification of possible impurities,
- Number and Volume of different packages for the same product,
- Formulation of the product,
- Density of the product,
- Gravity of the product,
- Recommended application rate,
- Use type,
- Target organism,
- List of crops the product is registered for.

The data transfer could work via the Internet using a password protected online database hosted at the ECB. In return, the central product database will provide the manufacturer with an unique EU registration number and an unique EU barcode for the registered product. The manufacturer must use the EU product registration number and the barcode[31] on the label of the product. Copies of these databases as well as regular updates must be submitted to the Member State agencies. A pesticide label database containing all non-confidential data should be accessible in the Internet.

8. 4 Data Harmonisation and Coding System

Each Member State currently uses its own system of codes for crops, foodstuffs, pesticides etc. Even within one Member State different agencies use different codes. The establishment of a pesticide use reporting system offers the opportunity to create one uniform coding system. A new uniform code system should not just serve harmonisation among the Member States. Pesticide use data evaluation is much more efficient with a smart code system. This means code

31 Bar codes could be used for tracking retail sales data. See Rothlein, J., Jenkins, J. (2000); Oregon Pesticide Use Reporting System, Analytical Review, pg. 106 - 114 , Oregon Department of Agriculture, Salem, USA,

numbers used in the PUR system should contain encoded information. Table 11shows an example what encoded information the EU product registration number could contain.

Table 11: Example for Encoded Information in the EU product registration number

Product information	***Code Example***	***Number of Digits***
Use type	1 = Acaricide 2 = Acaricide/ Insecticide 3 = Fungicide 4 = Herbicide 5 = Insecticide ... etc.	1
Member State of approval	01 = Belgium 02 = Germany 03 = Greece ... etc. (alphabetically)	2
Toxicity regarding Directives 1999/45 and 67/548	01 = T+ (Very Toxic) 02 = T (Toxic) 03 = Xn (harmful) 04 = Xi (irritant) 05 = N (Dangerous for Environment 06 = T+; N (Very Toxic; Dangerous for Environment) 07 = R 68 (Risk phrase 68 = Possible risks of irreversible effects.)	2
Serial number in the EU	999999	6 digits

Using this example the EU product registration number would have 11 digits. This means that any EU product registration number of a very toxic insecticide authorized in Germany would start with the code number 50201-xxxxxx. Thus first 5 digits describe the product and make it possible to easily analyse reported pesticide use data. It would also be useful to include information on the formulation of the product. The information if the product applied was in granular form or a spray is important for exposure assessments. However, the EU product registration number cannot be extended arbitrarily, reporting errors are more likely with an increasing length of a number.

Similar coding system should be developed for crops/sites, ingredients and locations. The classification used by Eurostat in Table 5 could serve as a base for crop codes. Genetically engineered crops should get separate codes. Codes for ingredients could include information on the chemical class, because ingredients belonging in one chemical classes can have the same modes of action. Organophosphates and carbamate pesticide, for example, cause the effect of cholinesterase inhibition. Information on toxicity, specific physical properties and/or environmental behaviour such as leaching potential could also be encoded in a chemical code for the ingredients.

The European Commission should appoint a working group including data base specialists, environmental health professional, chemists, biologist and pesticide experts to create such code system.

8. 5 Information Outreach

Setting-up a PUR system requires communication of purposes and aims of such system to the farmers. The Member States in cooperation with the EU need to develop instruction guidelines for use reporting. These should explain the why reporting is needed, who has to report and how records can be submitted. Frequently asked question should be answered and other information resources showed. It should be emphasised that pesticide use reporting data are not used to pursue illegal uses.

In Germany, the Chambers of Agriculture conduct workshops with farmers. These workshops could be used to introduce PUR systems to the farmers.

8. 6 Pilot Programme

The EU Member States need to start pilot programme after considering the extent of the PUR system and the development of reporting form and formats. The pilot programme will provide Member States with data to evaluate the reporting forms and formats, data transfer, report processing, and data entry time, quality assurance procedures, and design and test confidentiality rules. By participating in the pilot system, pesticide users can assist the Member States in the final design of the program, and make sure that individual situations are taken into account. The pilot programme should be evaluated by sending out questionnaires to the participants.

9 Compliance Control and Data Quality Assurance

In order to control compliance with a pesticide use reporting regulation and to ensure a high data quality several tools need to be developed.

9. 1 Farmers Acceptance

Farmers education and training are probable the best way to ensure compliance and data quality. Participation of farmers is most likely ensured if the farmers are convinced that the collection of pesticide use data is beneficial for their pest management and for the protection of the environment. Pilot programme and farmers training (see Chapter 8. 5 and 8. 6) should be used to promote the concept of PUR systems. Agencies which are responsible for use reporting could offer services to the reporting person such as economic evaluations of plant protection measurements.

In Oregon not reporting or false reporting are prohibited by law. The Oregon Department of Agriculture must investigate and enforce this law but they also realised the challenge of compliance control. However, their initial focus will be on outreach rather than enforcement to raise reporting compliance.[32]

32 ibid. 20

The reporting process has to be organised as simple as possible to relief the reporting person from unnecessary workload. Paper forms and/or Internet interfaces used for reporting have to be designed that uncomplicated reporting is possible. Electronic reporting provides the possibility that wrong data entries are immediately recognised and submitting of incorrect data is not possible. Electronic reporting allows that farmers can be reminded by e-mail if they forget to report their use

9. 2 Financial Aid and Applicator Legitimation

The European Union could bind financial aid to use reporting. Financial aid could be stopped to persons, who are legally required to report their pesticide use, but do not submit data.

Another way to ensure compliance would be an applicator legitimation. This would be very much like a drivers license. There must be a legal requirement in all Member State that professional applicators e.g. applicator in course of business, have to make a training and a test in order to get a legitimation as pesticide applicator. This training should include proper reporting of pesticide use. Only persons who have this legitimation can legally buy and apply agricultural pesticide products. Persons, who do not report their pesticide use may loose the legitimation to buy and apply pesticides. For individual farm inspections each applicator should also be required to keep the sales receipts.

9. 3 Collection of Retail Sales Data

A comparison of reported use with sales data can serve as an indicator whether or not pesticide use reporting legislation is fully accomplished. Pesticide retail sellers as well as the pesticide user need to keep the receipt for at least one year.

Retailers also could report the sales of products containing pesticides active ingredients. In order to identify individual products the bar codes could be used. This means products containing pesticide active ingredients need unique bar codes which are the key to specific product information. This method would only work for retail sellers which are using a scanner on the cashier. The specific bar codes could then be extracted from the retailers sales data base, which could include a function which finds and submits sales information about products containing pesticide active ingredients. Retailers, who do not use scanners need to keep records of their sales of such products. The EU registration numbers and the number of sold products as well as the location of the retail store should then be reported monthly to a governmental organisation. This information could be used for compliance control for pesticide use reporting systems.

10 Financing a European PUR System

The costs to develop and maintain a PUR system strongly depend on the extent of the reporting. In general, a decentralised PUR system using paper records is more expensive than a PUR system, which works central and entirely electronic. For the development of the Oregon PUR system (central, electronic) and the biennial 2001-2003 $ 2,6 million funds were made available.

Annual costs for the California PUR (decentralised, paper-record, electronic) are estimated to be $ 1,8 million. Staff, equipment and the offices of the County Agricultural Commissioners are

not only employed in the PUR system, but also for other pesticide and agricultural regulatory issues, funds for these position derive from other programme.

A cost estimation for a European PUR system cannot be done prior to a decision about the extent and the data entry format of a PUR system. The Oregon Department will finalise its on-line PUR data base in November 2002. A possibility to reduce development costs would be to assess this software with European data, and possibly to make an agreement with Oregon to use the modified software.

Almost half of the EU budget for 2002, some 44.255 million Euro, are allocated to the Common Agricultural Policy (CAP) of the European Union. In the timespan 1993 - 1998 of the EU spent 5.500 million Euro for the Agri-environment Programme according regulation No. 2078/92 EEC.[33] Allocating money from CAP and from Agri-environment Programme would be one option to finance a PUR system. A PUR system can prevent external costs to clean the environment from pesticide contamination, and cost for the PUR system would finally pay off.

The statistic agency of the EU, Eurostat, maintains the TAPAS (technical action plan for agricultural statistics) programme. For pesticide use statistics TAPAS grants 200.000 Euro to Member States for the enforcement of pesticide use surveys.[34] Parts of this money could be spent on PUR pilot programme implemented by Member States.

The Sixth Environmental Action Programme of the European Community, adopted in 2002, cautiously suggests to include: "...*encouraging the introduction of fiscal incentives to reduce the use of the most dangerous pesticides such as a pesticides tax*" as an element of a Community Thematic Strategy on the sustainable use of pesticides.[35] Funds for a PUR system may be raised by implementing such a pesticide levy or tax, which could be expanded to all pesticide products. The European pesticide market amounted to 5.955 million Euro in the year 2000.[36] A Mill Tax as employed in California of 17,5 mills, which would be a rate of 0,0175 Euro per Euro of sales of pesticides at the first point of sales, would annually raise over 100 million Euro in Europe.

An increase of the value added tax (VAT) for pesticide products or an increase of the product registration fees could be another sources for funds. Table 12 shows the current VAT by Member State.

Table 12: VAT Rates for Pesticides

Country	VAT rate in %
Belgium	21
Denmark	25
Germany	16
Greece	8
Spain	7
France	5,5
Ireland	21

33 Europäische Kommission, (1998): Anwendungsstand der Verordnung (EWG) No. 2078/92, Evaluation von Agrar - Umweltprogrammen, Brussels, Belgium
34 personal communication with Christian Heidorn, Eurostat
35 ibid 1
36 Agrow, World Protection News, January 4th 2002, No 391

Table 12: (continued) VAT Rates for Pesticides	
Country	VAT rate in %
Italy	10
Luxembourg	15
Netherlands	6
Austria	20
Portugal	5
Finland	22
Sweden	25
United Kingdom	17,5

Some of the costs arising in a PUR system can be transferred to the pesticide industry and the reporting person. The industry has to bear the costs for submitting product data as cited in Chapter 8. 3 to the central product registration data base. The manufacturer could also be required to place standardised paper forms in the packages of it products. These forms could be product specific, and contain printed information, such as the product registration number and the list of crops it is authorized for.

11 Summary

This study emphasizes the need for a European pesticide use reporting system and outlines options and possibilities for the development of such systems in the European Union. Pesticide use reporting systems are urgently needed in Europe to properly assess risks associated with pesticide use and to enforce and evaluate targeted risk reduction measures. Focus of this study lays on reporting of agricultural pesticide use. However, many discussed options and requirements are also applicable in non-agricultural pesticide use reporting system.

Approach of this study is not the development of one model of a pesticide use reporting system for the European Union. Two factors mainly influence the development a pesticide use reporting system: the character of the agriculture as well as human and financial resources. Implementation of the options and possibilities discussed in this study strongly depends on these factors, and both factors differ immense among individual EU Member States. The Member States are therefore responsible for the design of their individual pesticide use reporting system.

The study shows, which framework has to be accomplished by the European Union in order to establish pesticide use reporting systems, whose results are uniform and comparable. Options and possibilities presented in this study are guides for discussions in Member States, which are going to develop pesticide use reporting systems. Member States should always consider that pesticide use reporting systems can be implemented step by step, aiming at a full reporting system.

Utilisation of actual pesticide use data is the best approach towards high protection of human health and the environment. Reporting use data by the applicator is the best way to obtain these data. Options and possibilities for pesticide use reporting system are presented in this study.

Appendix One